EPSON *Endeavor* 468C

User's Guide

FCC COMPLIANCE STATEMENT
FOR AMERICAN USERS

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio and television reception. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult an experienced radio/TV technician for help.

WARNING

The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels that exceed the limits established by the FCC for this equipment. It is the responsibility of the user to obtain and use a shielded equipment interface cable with this device. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment,

FOR CANADIAN USERS

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le réglement sur le brouillage radioélectrique édicté par le Ministére des Communications du Canada.

EPSON®

User's Guide

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DISCLAIMER OF WARRANTY

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Torrance, California 400230800

Important Safety Instructions

1. Read all of these instructions and save them for later reference.

2. Follow all warnings and instructions marked on the computer.

3. Unplug the computer from the wall outlet before cleaning. Use a damp cloth for cleaning; do not use liquid or aerosol cleaners.

4. Do not spill liquid of any kind on the computer,

5. Do not place the computer on an unstable cart, stand, or table.

6. Slots and openings in the cabinet and the back or bottom are provided for ventilation; do not block or cover these openings. Do not place the computer near or over a radiator or heat register.

7. Operate the computer using the type of power source indicated on its label.

8. If you plan to operate the computer in Germany, observe the following safety precaution:

   To provide adequate short-circuit protection and over-current protection for this computer, the building installation must be protected by a 16 Amp circuit breaker.

   Beim AnschluB des Computers an die Netzversorgung muB sichergestellt werden, daB die Gebäudeinstallation mit einem 16 A Überstromschutzschalter abgesichert ist.

9. Connect all equipment to properly grounded (earthed) power outlets. If you are unable to insert the plug into an outlet, contact your electrician to replace your outlet. Avoid using outlets on the same circuit as photocopiers or air control systems that regularly switch on and off.

10. Do not allow the computer's power cord to become damaged or frayed.

11. If you use an extension cord with the computer, make sure the total of the ampere ratings of the devices plugged into the extension cord does not exceed the ampere rating for the extension cord. Also, make sure the total of all products plugged into the wall outlet does not exceed 15 amperes.

12. Do not insert objects of any kind into this product through the cabinet slots.

13. Except as specifically explained in this User's Guide, do not attempt to service the computer yourself. Refer all servicing to qualified service personnel.

14. Unplug the computer from the wall outlet and refer servicing to qualified service personnel under the following conditions:

    A. When the power cord or plug is damaged.

    B. If liquid has entered the computer.

    C. If the computer does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage and often requires extensive work by a qualified technician to restore the computer to normal operation.

    D. If the computer has been dropped or the cabinet has been damaged.

    E. If the computer exhibits a distinct change in performance.

Instructions Importantes de Sécurité

1. Lire complètement les instructions qui suivent et les conserver pour references futures.

2. Bien suivre tous les avertissements et les instructions indiqués sur l'ordinateur.

3. Débrancher l'ordinateur de toute sortie murale avant le nettoyage. Utiliser un chiffon humide; ne jamais utiliser un nettoyeur liquide ou une bonbonne aerosol.

4. Ne jamais renverser un liquide d'aucune sorte sur l'ordinateur.

5. Ne pas placer l'ordinateur sur un chariot, un support, ou une table instable.

6. Les évents dans les meubles,á l'arrière et en dessous sont conçus pour l'aération; on ne doit jamais les bloquer. Ne pas placer l'ordinateur prés d'une source de chaleur directe.

7. Le fonctionnement de l'ordinateur doit s'effectuer conformement au type de source d'alimentation indiquée sur l'étiquette.

8. Lorsqu'on desire utiliser l'ordinateur en Allemagne, on doit observer les normes securitaires qui suivent:

   Afin d'assurer une protection adequate à l'ordinateur contre les court-circuits et le survoltage, l'installation de l'edifice doit comprendre un disjoncteur de 16 amp.

9. On doit brancher tout l'équipement dans une sortie reliée à la masse. Lorsqu'il est impossible d'insérer la fiche dans la prise, on doit retenir les services d'un électricien ou remplacer la prise. Ne jamais utiliser une prise sur le meme circuit qu'un appareil à photocopie ou un système de contrôle d'aération avec commutation marche-arret.

10. S'assurer que le cordon d'alimentation de l'ordinateur n'est pas effrite.

11. Dans le cas où on utilise un cordon de rallonge avec l'ordinateur, on doit s'assurer que la valeur totale d'ampères branches dans le cordon n'excède en aucun temps les ampères du cordon de rallonge. La quantité totale des appareils branches dans la prise murale ne doit jamais excéder 15 amperes.

12. Ne jamais insérer un objet de quelque sorte que ce soit dans les cavités de cet appareil.

13. Sauf tel que spécifié dans la notice d'utilisation, on ne doit jamais tenter d'effectuer une reparation de l'ordinateur. On doit référer le service de cet appareil à un technicien qualifié.

14. Débrancher l'ordinateur de la prise murale et confier le service au personnel de service qualifié selon les conditions qui suivent:

    A. Lorsque le cordon d'alimentation ou la prise sont endommagés.

    B. Lorsquun liquide s'est infiltré dans l'ordinateur.

    C. Lorsque l'ordinateur refuse de fonctionner normalement même en suivant les instructions. N'ajuster que les commandes qui sont énumérées dans les instructions de fonctionnement. Tout ajustement inadéquat de tout autre contrôle peut provoquer un dommage et souvent nécessiter des réparations élaborées par un technicien qualifié afin de remettre l'appareil en service.

    D. Lorsqu'on a échappe l'ordinateur ou que l'on a endommagé le boîtier.

    E. Lorsque l'ordinateur démontre un changement noté au niveau de sa performance.

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Chapter 2 *Running the SETUP Program*

Chapter 3 *Using Your Computer*

Chapter 4 *Installing and Removing Options*

Chapter 5 Installing and Removing Drives

Chapter 6 Troubleshooting

Introduction

Your new Epson® computer is a fast, high-performance system offering flexibility and expandability in a compact design. Standard features include:

- *486SX/25* MHz, 486DX/33 MHz, or 486DX2/50 MHz microprocessor
- 4MB of internal memory, expandable to 36MB
- System and video BIOS shadow RAM
- 8KB of internal processor cache, with support for 64KB, 128KB, or 256KB external cache
- 512KB of on-board video memory, expandable to 1MB
- Math coprocessor built into the microprocessor for the 33 MHz and 50 MHz systems
- Built-in VGA port
- Two built-in serial ports and one built-in parallel port
- Built-in IBM® PS/2™ compatible keyboard and mouse ports
- On-board VGA feature connector
- Four 16-bit (or 8-bit) ISA option slots
- Support for up to three internal mass storage devices
- Password security.

Using the built-in interfaces, you can connect your peripheral devices directly to the computer so you don't have to install option cards. Use the option slots to enhance your system with such functions as a modem card or additional interface ports.

With 512KB standard video memory, the built-in VGA adapter supports resolutions of up to 800 x 600 (256 colors), and 640 x 480 (64K colors). Extend the video memory to 1MB to support resolutions of 1280 x 1024 (16 colors), 1024 x 768 *(256* colors), or 800 x 600 (64K colors).

If you install a high-resolution graphics adapter card or full-motion, multi-media card, you can connect it to the computer's VGA feature connector. This allows you to use the adapter's special graphics features while accessing the standard VGA signals provided by your main system board.

VGA Utilities

Your computer comes with special VGA drivers and utilities for use with the integrated VGA interface. Use these utilities to take advantage of extended VGA features such as high resolutions and 132-column text mode when you run popular application programs. Instructions for installing and using these drivers are in a readme file called VGADRV.TXT on the Utilities 1 diskette. If your system came configured with a hard disk drive, you may also find this file by selecting the VGA Utils group icon in Microsoft®Windows'". See page 2-19 for more information.

Optional Equipment

You can easily upgrade your computer by installing additional memory and a wide variety of options, as described below. (Installation instructions are provided in Chapters 4 and 5.)

System Memory

By adding lMB, 4MB, or 16MB SIMMs (single inline memory modules) to the main system board, you can expand the computer's memory up to 36MB.

Cache Memory

You can increase the cache memory on your main system board to 256KB by having additional SRAM chips installed by an Authorized Epson Servicer. Additional cache allows your system to access frequently used data faster.

Video Memory

You can add video memory chips to your system board to increase the video memory to 1MB and support higher video resolutions, multimedia graphics adapter cards, or applications that require higher memory.

OverDrive Processor

You can enhance your 25 MHz or 33 MHz system by replacing your microprocessor chip with an Intel® OverDrive™ processor. This processor doubles the internal clock speed so your system runs much faster.

Math Coprocessor

If you have the 25 MHz system, you may want to install an 80487SX, 25 MHz coprocessor. This optional microprocessor includes a built-in math coprocessor so your computer performs mathematical functions faster.

Drives

Your system supports up to three mass storage devices, including hard disk drives, diskette drives, a tape drive, or a CD-ROM drive.

How to Use This Manual

You don't have to read everything in this book to use your computer; see the following chapter summaries to find the sections you need.

Chapter 1 provides steps for setting up your system and connecting peripheral devices.

Chapter 2 describes how to run the SETUP program to define your computer's configuration. Do this the first time you use your computer. If you change the configuration later, you will need to run it again.

Chapter 3 covers general operating procedures, such as turning the computer on and off, using disks and disk drives, entering a password, and changing the processor speed.

Chapter 4 describes how to install optional equipment such as option cards and memory modules.

Chapter 5 explains how to install and remove disk drives.

Chapter 6 contains troubleshooting tips.

Appendix A lists the specifications of your computer.

At the end of this manual, you'll find a **Glossary** and an Index.

Conventions Used in This Manual

This manual uses the following type conventions:

Example	Meaning
Enter	Keys you press on the keyboard
Ctrl C	Keys you press at the same time; hold down the key marked c and press the letter C
`C:\DOS`	Text as it appears on the screen
`DISKCOPY A: B:`	Text that you type exactly as shown
path\filename	Words printed in lowercase italics represent optional parameter names; here you would type the actual path and filename, such as \WORK\CONTACT
SERIAL 1	Names of hardware elements

Where to Get Help

If you purchased your computer outside the United States, please contact your dealer or the marketing location nearest you for customer support and service. International marketing locations are listed at the back of this manual.

If you purchased your computer in the United States, Epson provides the following support services through the Epson Connection[SM]:

- ❑ Technical assistance with the installation, configuration, and operation of Epson products
- ❑ On-site Servicer referral
- ❑ Assistance in locating your nearest Authorized Epson Reseller of Service Center
- ❑ Sales of Epson computers as well as ribbons, supplies, parts, documentation, and accessories for your Epson product
- ❑ Customer Relations
- ❑ Epson technical information library fax service-also available directly by calling the toll number (310) 782-4214
- ❑ Product literature with technical specifications on our current and new products.

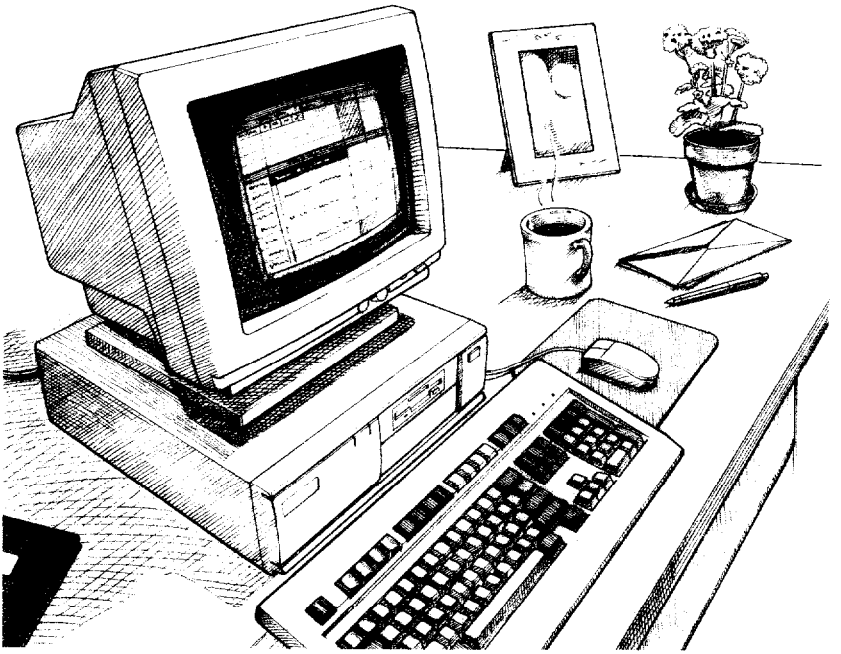
If you need help with any software or hardware you are using, see the documentation that came with it for technical support.

Epson Connection: (800) 922-8911

Chapter 1

Setting Up Your System

To set up your computer, follow the steps in this chapter. If you purchased additional options, see Chapters 4 and 5 for instructions on how to install them before you set up your system.



1 Choosing a Location

When selecting a place to set up your system, choose a safe, convenient location that provides the following:

- A flat, hard surface. Surfaces like beds and carpets attract static electricity, which can erase data on your disks, damage the computer's circuitry, and prevent proper ventilation.
- Good air circulation. Leave several inches of space around the computer so air can move freely.
- Moderate environmental conditions. Select a cool, dry area and protect your computer from extremes in temperature, humidity, dust, and smoke. Avoid direct sunlight or other heat sources.
- No electromagnetic interference. Do not place your system too close to any electrical device, such as a telephone or television, which generates an electromagnetic field.
- Appropriate power source. Connect all your equipment with the appropriate power cords for the power source in your area. If you are operating the computer in a country other than the one in which you purchased it, see "Power Source Requirements" in Appendix A for the cord you should use.

2 Connecting a Monitor

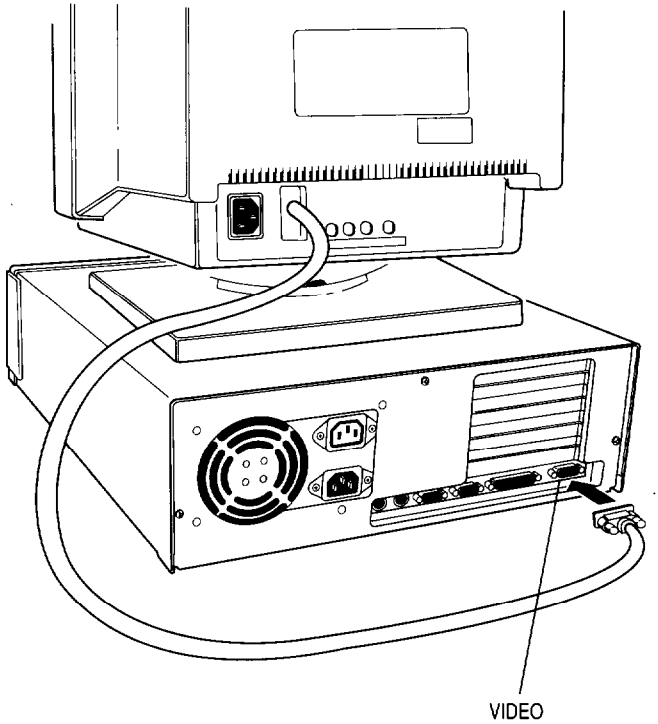
If you have a VGA monitor (or a multifrequency monitor with an analog connector), you can connect it to the computer's built-in VGA port as described below. If you have any other type of monitor (or if you want to install a display adapter card to control your monitor), see Chapter 4.

Follow these steps to connect your VGA monitor to the computer's built-in VGA port:

1. Place the monitor and computer so the backs are facing you.

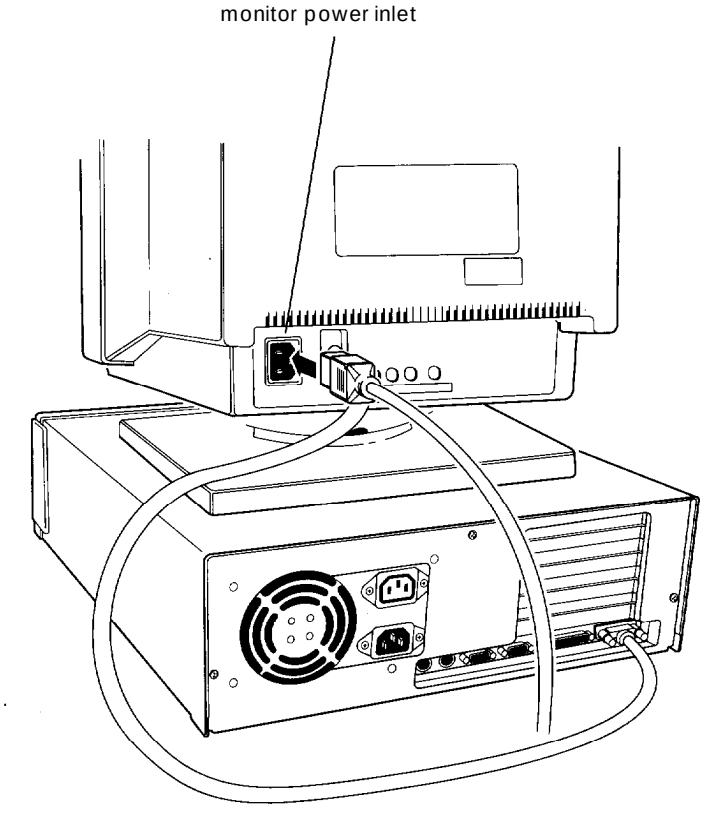
2. There should be two cables provided with your monitor: the monitor cable (to connect it to the computer) and the power cable (to connect it to a power source). On most monitors, the monitor cable is permanently attached to the monitor, as shown in the following illustration. If your monitor does not have an attached cable, connect the cable to it now. (See your monitor manual for instructions.)

3. Align the connector on the monitor cable with the **VIDEO** port on the computer; then insert the connector. Be careful not to bend the pins when inserting it.



4. If the connector has retaining screws, tighten them.

5. Plug the monitor power cord into the monitor's power inlet.



6. Plug the other end of the power cord into an appropriate grounded electrical outlet or, if the cord has the correct type of plug, into the power outlet on the back of the computer.

Caution
Before you plug the monitor's power cord into the back of your monitor, make sure the monitor's power requirements do not exceed 1 Amp.

3 Connecting a Printer or Other Device

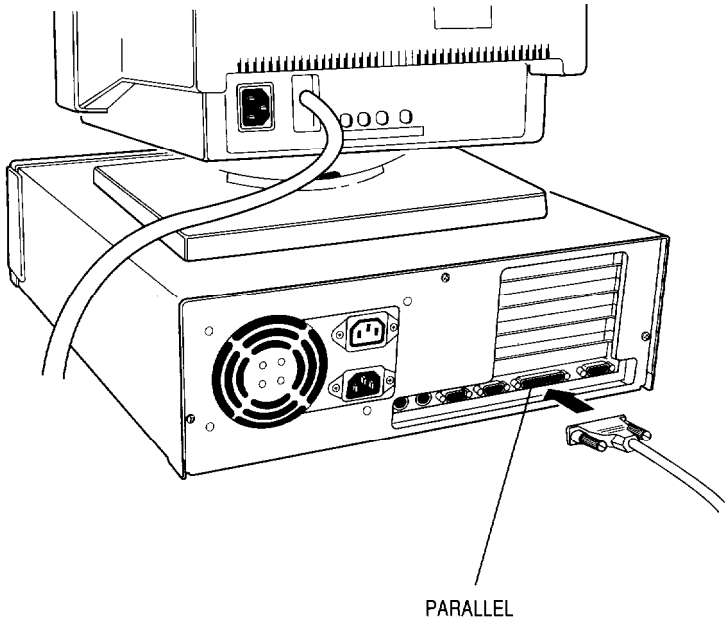
Your computer has one parallel and two serial ports. To connect a printer or other peripheral device, follow the instructions below.

Using the Parallel Port

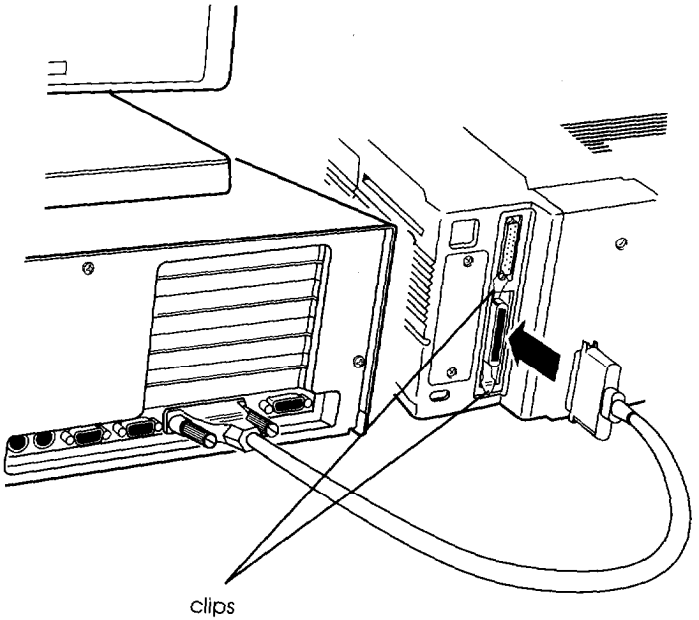
Follow these steps to connect a parallel printer to your computer:

1. Place the printer next to the computer so that the backs are facing you.

2. Align the connector end of the printer cable with **the PARALLEL** port, as shown below, and plug it in. If the connector has retaining screws, tighten them.



3. Connect the other end of the cable to the printer as shown below. To secure the cable, squeeze the clips at each side of the printer port and push them into place.

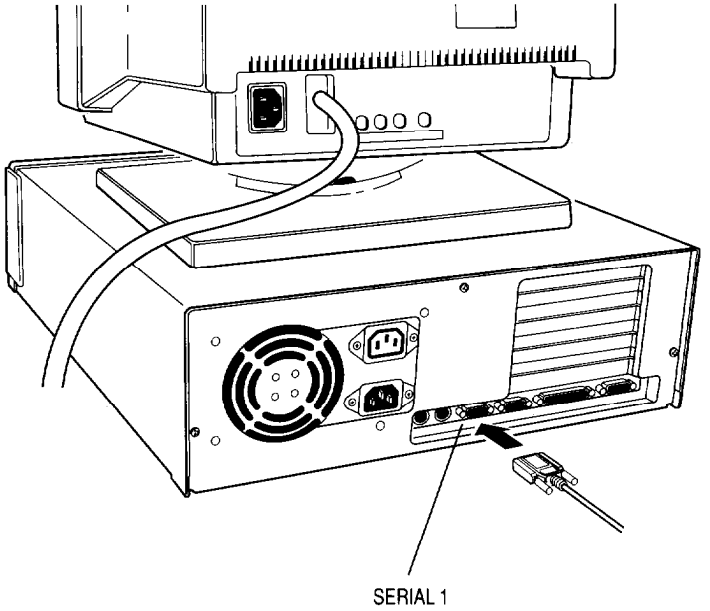


4. Plug the printer's power cord into an appropriate grounded (earthed) electrical outlet.

Using the Serial Ports

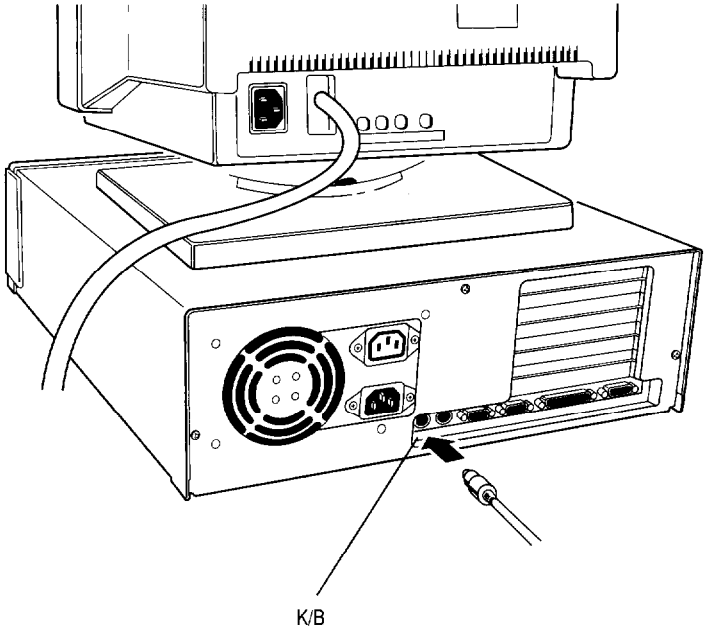
If you have a printer, a modem, or other peripheral device with a serial interface, you can connect it to one of the serial (RS-232C) ports on the back of the computer. These ports use a DB-9P connector, so be sure you have a compatible cable.

To connect a serial device, insert the connector into one of the ports, marked **SERIAL** 1 and **SERIAL** 2. If you are connecting only one serial device, use the **SERIAL 1** port, as shown below.



4 Connecting the Keyboard

To connect the keyboard, hold the cable connector so the arrow on the connector faces up. Insert it into the port marked K/B, as shown below.



Caution
Although the connectors and ports for the keyboard and mouse are physically identical, they cannot be used interchangeably. Be sure to plug the keyboard connector into the keyboard (K/B) port or you could damage your system.

You can change the angle of the keyboard by adjusting the legs on the bottom. Turn it over and flip each leg upward until it locks into place. It is important to select the best angle so you will prevent wrist fatigue. (You may even want to purchase a wrist pad-sold at computer stores-for further comfort.)

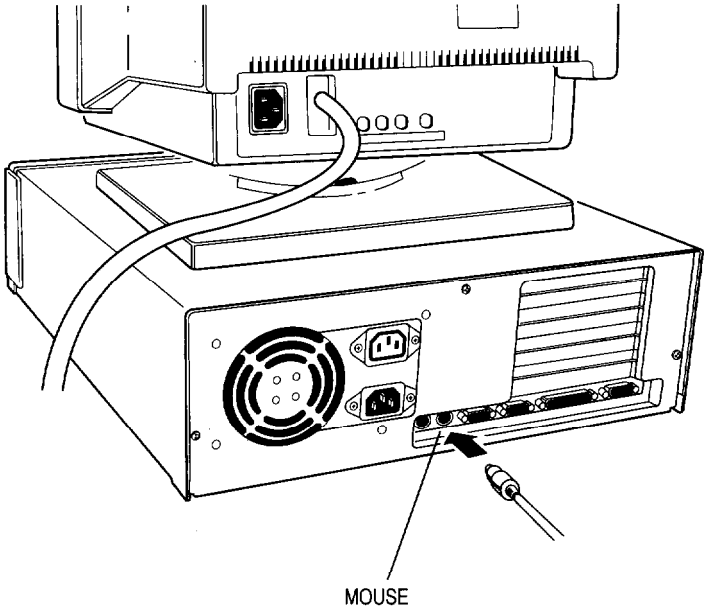
To lower the keyboard, press each leg back into its slot.

5 Connecting the Mouse

Your computer includes an auxiliary port for an IBM PS/2 compatible mouse that uses a round, miniature DIN (6-pin) connector. If your mouse has this type of connector, you can connect it to the computer's built-in port.

> **Note**
> If your mouse requires a different interface, connect it to the built-in serial port or an option card that provides the interface. Your system will properly identify the location of your mouse.

To connect the mouse to the built-in mouse port, plug the connector into the port marked **MOUSE,** as shown below.



Caution
Although the connectors and ports for the mouse and keyboard are physically identical, they cannot be used interchangeably. Be sure to plug the mouse connector into the **MOUSE** port, or you may damage your system.

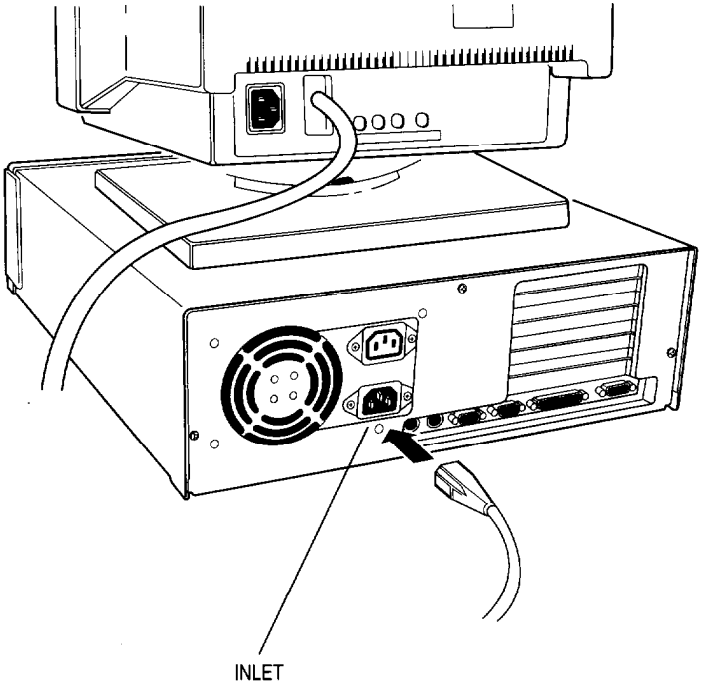
If your system has not already been configured, you may need to install a mouse driver. See your mouse manual for instructions.

6 Connecting the Power Cord

Follow these steps to connect the power cord:

1. Plug **the** power cord into the AC power **INLET on** the back panel, as shown below.

> WARNING
> To avoid an electric shock, be sure to plug the cord into the computer before plugging it into the wall outlet.



2. Plug the other end of the power cord into an appropriate grounded (earthed) electrical outlet.

7 Turning On the Computer

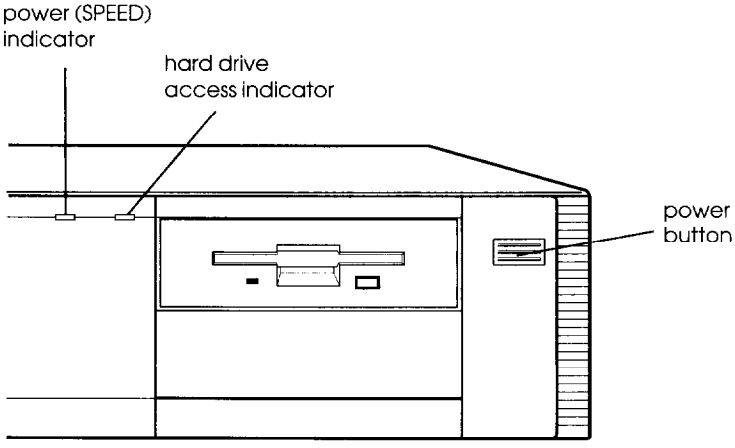
After you set up your system, you're ready to turn on the power. Check the following safety precautions to avoid accidentally damaging your computer or injuring yourself:

- Do not connect or disconnect any peripheral device cables (including the mouse or keyboard) or power cables unless the computer power is off.
- Never turn off or reset your computer while a disk drive light is on. This can destroy data stored on the disk.
- Never turn on the computer with a protective card in the diskette drive.
- Always wait about 20 seconds after you turn off the power before you turn it on again to prevent damage to the computer's electrical circuitry.
- Do not leave a beverage near your system. Spilled liquid can damage the circuitry.

Follow these steps to turn on the system:

1. Turn your computer around so the front panel faces you. Place your monitor, printer, and other devices in a convenient arrangement.
2. If there is a protective card in the diskette drive, remove it.
3. Turn on the monitor, printer, and any other devices connected to the computer.

4. To turn on the computer, press the power button on the right side of the front panel.



The power indicator on the left side of the front panel lights up. After a few seconds, the screen displays a count of the system memory, and then the computer performs a power-on diagnostics routine to make sure everything is working correctly.

5. If necessary, use the controls on your monitor to adjust the brightness and contrast until you can easily see the characters on the screen. If your monitor has horizontal and vertical hold controls, you may need to use them to stabilize the display.

6. The screen displays the following prompt:

Press <Del> if you want to run SETUP

Do not press any key yet; you just want to make sure the computer is working. This prompt appears every time you turn on your computer so you can run SETUP if necessary. After a few seconds, the prompt disappears.

If there is no operating system installed on your computer, you see an error message. Ignore the message for now; once you install the operating system, you will not see this message. If MS-DOS@ is already installed, you may see the command prompt (C : \) or the menu screen of a program such as Microsoft Windows.

Now you need to run SETUP to make sure your computer is configured properly. First turn off the computer, as described below, then see Chapter 2 for instructions. When you finish running SETUP, be sure to see "Post-SETUP Procedures" on page 2-19 for guidelines on what you need to do next.

Turning Off the Computer

Whenever you turn off your system, follow these steps:

1. Save your data and exit any application program you are using.

2. Check the hard disk drive light and the diskette drive light(s) to make sure they are not on. Do not turn off the computer if a drive light is on, because you can damage the drive or lose data.

3. Remove any diskette(s) from the diskette drive(s).

4. Press the power button to turn off the computer.

5. Turn off the monitor, printer, and any other peripheral devices.

Chapter 2

Running the SETUP Program

The first time you use your computer, you need to run the SETUP program to define how your system is set up. You may need to run it again later if you change your configuration.

SETUP is stored in the computer's read-only memory (ROM), so you can run it any time you turn on or reset your system. SETUP lets you verify or change the following:

- Current date and time
- Type of diskette drive(s) installed
- Type of hard disk drive(s) installed
- Type of video display adapter you are using
- Processor speed
- System booting sequence
- Diskette drive seek test
- System memory
- Coprocessor support
- Shadow ROM options
- Keyboard options
- Peripherals options
- Password options,

The configuration you define through SETUP is stored in a special area of memory called CMOS RAM. This memory is backed up by a battery, so it is not erased when you turn off or reset the computer.

Whenever you reboot the computer, it checks the settings, and if it discovers a difference between the information in the CMOS RAM and its actual hardware configuration, it prompts you to run SETUP. You see a message describing the error as well as the following prompt at the bottom of the screen:

Press <Fl> to run **SETUP or <F2> to continue**

If this happens, press F1 to run SETUP and correct the setting.

Another SETUP option displays information about your system board. This information provides a useful reference about jumper and DIP switch settings, SIMM configuration, and hot key combinations. See page 2-17 for more information.

SETUP also lets you restore the default values for your configuration. This is useful if you have made changes but don't want to keep them; you can restore all the default settings. See "Loading Default SETUP Values" on page 2-17.

Starting the SETUP Program

To start SETUP, make sure there is no diskette in the diskette drive; then turn on your computer. (If your computer is already on, turn it off, wait 20 seconds, and then turn it on again.) After the self test, you see the following prompt at the bottom of the screen:

```
Press <Del> if you want to run SETUP
```

As soon as you see this message, press [Delete].

If you do not press [Delete] within approximately five seconds, the computer starts loading the operating system and you will not be able to run SETUP. If this happens, reset the computer and try again.

When you press [Delete), you'll see a SETUP menu containing these options:

```
1.  Start operating system
2.  Run SETUP
3.  Set Password options
4.  Display system board help
5.  Load default SETUP values
6.  SAVE settings and exit
7.  Exit without saving settings
```

Type the number of the menu option you want to select, or use [↑] or [↓] to move the cursor over the option you want to select and press [Enter]. As you highlight each menu selection, you'll see a description of the option at the bottom of the screen.

Entering SETUP Options

You can verify or change all SETUP functions except the password option from menu option 2, **Run SETUP.** To select this option, press ↓ to highlight it, then press Enter. You see the SETUP screen.

This screen displays the size of both the base and extended memory and whether a math coprocessor is installed. You also see a calendar for the current month at the bottom right of the screen.

Additionally, this screen contains system parameters you can change.

Selecting Options

A solid cursor bar highlights the selected parameter. Press ←, ↑, →, ↓ to move the cursor to the parameter you want to change. Then press Pg Up Pg Dn to display the available options.

As you move the cursor to each parameter, you see a description of the available options for that parameter at the bottom of the screen.

The following sections describe how to choose the correct SETUP parameters for your system.

Setting the Date and Time

The real-time clock in your computer continuously tracks the date and time-even when the computer is turned off. Once you set the date and time using SETUP, you should not need to change them, unless you need to adjust the time for daylight savings or other seasonal adjustments. (The computer automatically changes the date for leap years.)

Use the cursor arrow keys to position the cursor over the portion of the date or time you want to change. Press Pg Up or Pg Dn to modify the date or time. The time parameter uses a 24-hour clock. For example, 5 p.m. is shown as 17.

Setting the Diskette Drive(s)

Your system probably came with one diskette drive installed. You may also have another drive of a different size or capacity. The SETUP menu offers five possible selections for your diskette drives (A and B):

- 360KB, 5.25-inch
- 1.2MB, 5.25-inch
- 720KB, 3.5-inch
- 1.44MB, 3.5-inch
- Not Installed.

Check the settings for both drives and correct them if necessary. (If you have only one diskette drive or if you install a tape drive in the lower drive bay, select **Not Installed** for drive B.) If you install a combination (dual) diskette drive, the top drive is A and the bottom drive is B.

Setting the Hard Disk Drive(s)

The SETUP program lets you select the type of hard disk drive(s) installed in your computer. If you have two hard disk drives, the first one is C and the second one is D. Be sure to choose the correct setting for both drives. Follow these guidelines:

- If your system does not have a hard disk, select None for drives C and D. If you have only one hard disk drive, select None for drive D.
- If you installed a SCSI drive, select None for drive D.
- If your computer came with an Epson 120MB hard disk drive (or if you installed this drive yourself), select number 39 for drive C.
- If your computer came with an Epson 170MB hard disk drive (or if you installed this drive yourself), select number 26 for drive C.
- If your computer came with an Epson 240MB hard disk drive (or if you installed this drive yourself), select number 34 for drive C.
- If you have installed another type of hard disk drive, you need to select the drive type number that matches your drive. See "Hard Disk Drive Types" below.

> **Note**
> It is a good idea to check the drive type number on your disk drive before entering the type number, just to make sure it is correct.

Hard Disk Drive Types

The following table lists the types of standard hard disk drives you can use. Check this table and the documentation supplied with your hard disk to find the correct type number for your drive. If none of the types listed matches your drive, see "Defining Your Own Drive Type" on page 2-9.

Hard disk drive types

Type no.	Cylinders (CYL)	Heads (HDS)	Precomp	Landing zone	Sectors (SEC)	Size* (In MB)	Drive name/ manufacturer
1	306	4	128	305	17	10	
2	615	4	300	615	17	20	ST-225, ST-4026, WD-93024
3	615	6	300	615	17	31	ST-138A †
4	940	8	512	940	17	62	
5	940	6	512	940	17	47	
6	615	4	65535	615	17	20	CP-3024, ST-125, ST-125A, ST-325A
7	462	8	256	511	17	31	
8	733	5	65535	733	17	30	ST-4038
9	900	15	65535	901	17	112	
10	820	3	65535	820	17	20	
11	855	5	65535	855	17	35	
12	855	7	65535	855	17	50	
13	306	8	128	319	17	20	
14	733	7	65535	733	17	42	
15							- reserved -
16	612	4	0	663	17	20	
17	977	5	300	977	17	41	CDC 94205-51, CP-3044 †, CP-2044 †, 7040 †, 8051A †
18	977	7	65535	977	17	57	
19	1024	7	512	1023	17	60	CP-2064
20	733	5	300	732	17	30	MK-133FA
21	733	7	300	732	17	43	MK-134FA, ST-157A †
22	733	5	300	733	17	30	
23	306	4	0	336	17	10	

Hard disk drive types (continued)

Type no.	Cylinders (CYL)	Heads (HDS)	Precomp	Landing zone	Sectors (SEC)	Size* (In MB)	Drive name/ manufacturer
24	903	4	65535	902	46	81	CP-30084 ‡
25	776	8	65535	775	33	100	CP-3104
26	903	8	65535	902	46	162	
27	698	7	300	732	17	41	
28	976	5	788	977	17	79	
29							- reserved -
30							- reserved -
31	732	7	300	732	17	43	
32	1023	5	65535	1023	17	42	
33	901	5	65535	900	53	117	LPS120AT ‡
34	723	13	65535	722	51	234	LPS240AT ‡
35	934	16	65535	933	17	124	MK2124FC
36							- reserved -
37	683	16	65535	682	38	203	CP-3204F
38	548	8	65535	547	38	81	CP-2084
39	761	8	65535	760	39	116	CP-30104
40	980	10	65535	979	17	81	7080A, MK2024FC
41	1022	5	65535	1022	34	85	CDC 94216-106 (ESDI)
42	1022	5	65535	1022	36	90	CDC 94216-106
43	1024	8	512	1023	17	68	1325, 3085, LAN64, XT1085, NDR1085
44	828	10	65535	828	34	137	MK-156F
45	1024	5	512	1023	17	43	
46	615	8	128	618	17	40	
47							- user defined -

* Actual size when formatted may be slightly different than the size listed on the drive label

† Hard disk drive supported in translate mode

‡ Epson drives

Defining Your Own Drive Type

If the parameters for your hard disk (listed in its documentation) do not match any of the types listed in the table above, you can define your own type. Follow these steps:

1. With the cursor on the drive you are defining, press Pg Up until you see type 47.
2. Press → to move the cursor into the parameter fields.
3. Enter the appropriate values from the table below.

Drive type options

Heading	Description
Cyln	The number of cylinders on the drive
Head	The number of read/write heads in the drive
WPcom	The precompensation cylinder
Zone	The landing zone (the area on which the computer parks the heads)
Sec	The number of sectors on the drive

Press → after typing each number. Check your drive documentation for the correct value if SETUP does not accept a value you've typed. SETUP provides the hard disk size based on the other values you entered.

Setting the Primary Display Type

The Primary display option lets you define the type of adapter you are using for your primary display. If you connected your monitor to the computer's built-in VGA port, select **VGA/PGA/EGA.** If you installed a video card, check the following table for the correct adapter type.

Video display type options

Select	If
VGA/PGA/EGA*	You connected your monitor to the built-in VGA port or you installed a VGA or enhanced graphics adapter (EGA) card
Color 40x25	You installed an optional color graphics adapter that is set to 40-column CGA mode
Color 80x25	You installed a color graphics adapter (CGA) or a multi-mode graphics adapter (MGA) attached to a color monitor; be sure to set the color/mono switch on the MGA card to color
Monochrome	You installed a monochrome display adapter (MDA). an MGA, or a Hercules® MGA attached to a monochrome monitor; be sure to set the color/mono switch on the MGA card to mono

Default setting

For a composite color monitor, such as a color television with video input, try selecting Color 80x25. If the monitor's resolution is poor, run SETUP again and select Color 40x25.

If you have two display adapters of different types, select the setting for the one you want to be your primary display adapter. The other one is your secondary adapter.

If you install one type of display adapter card and then change the adapter (from VGA to CGA or vice-versa), you also may need to change the setting of DIP switch 5. If you have two types of cards, set the jumper and DIP switch to match the adapter controlling your primary display. See Chapter 4 for instructions on changing jumper settings and the manual that came with your monitor for additional information.

Setting the Processor Speed

The System speed option lets you set the default speed for your system. When you select **Fast,** your system operates at your processor's highest speed, such as 25,33, or 50 MHz. The **Slow** option simulates an 8 MHz processor to provide compatibility with older application programs.

At fast speed, your system can access memory faster, so your programs work faster. Select **Fast** unless you are using an application program that requires the slower speed. Check your program manual.

You can also change the speed temporarily by entering a keyboard command. See "Changing the Processor Speed" in Chapter 3 for more information.

Setting the Booting Sequence

The booting sequence determines the order in which the computer checks the drives when it looks for the operating system.

For example, if you select **A : then C,** each time you turn on the computer it checks drive A for an operating system diskette and loads the operating system from that diskette. If drive A does not contain an operating system diskette, the computer loads the operating system from drive C. This is the default setting because you may sometimes want to boot the computer from a system diskette in drive A.

If you select **C : only,** the computer loads the operating system from drive C and does not check drive A. This setting allows the computer to load the operating system a little faster.

Setting the Diskette Seek Parameter

If you enable the Diskette seek test option, the system checks for a diskette drive during its power-on diagnostics. If no diskette drive is connected, you see a diskette drive error. Disable this option if you want your system to boot when no diskette drive is connected.

Using the SETUP Screen Submenus

The SETUP screen contains three submenus that allow you to change these settings:

- Shadow ROM options
- Keyboard options
- Peripheral options.

To access the options on these submenus, move the cursor to the **Shadow setup,Keyboard setup,** or **Peripherals setup** parameters. You see a window to the right of the screen that contains the options for the parameter you have selected.

Press m to move the cursor into the window. Then press the arrow keys to move the cursor to the option you want to change. Press Pg Up or Pg Dn to scroll through the available options.

Setting the Shadow Options

Your computer can access RAM (random access memory) faster than ROM (read only memory). The Shadow feature on your system automatically copies the contents of both the system BIOS and the video BIOS into RAM so your system can perform certain operations faster.

Four additional shadow options allow you to shadow 32KB at the memory addresses listed on the screen. You may want to enable one or more of these shadow options if, for example, you are using option cards that contain ROM. You can shadow the memory on the card to your system's RAM using these options. Check the memory map on page A-6 and the documentation that came with your option card to determine which addresses your option card can access. You may also need to set some switches or jumpers on the option card.

Setting the Keyboard Options

There are four options for the keyboard: Test, NumLock, Key rate, and Key delay. The table below describes the settings available.

Keyboard options

Option	Settings	Description
Test	Enabled' Disabled	Tests keyboard at power-on Skips keyboard test at power-on
NumLock	On* Off	Determines initial NumLock status when system is turned on or reset
Key rate	2.0-30.0 (characters per second)	Sets rate at which a character repeats when key is held down; default is 10.9
Key delay	0.25-1.OO (seconds)	Sets period of delay between the time a key is pressed and the character appears on the screen; default is 0.50

Default setting

Setting the Peripherals Options

The **`Peripherals setup`** option lets you change the settings for the built-in interface ports and disk drive controllers. You may need to change these settings if you install an interface on an option card. The following table lists the possible settings.

I/O *control options*

Peripherals option	Setting	Description
Serial	COM1+2*	Sets serial port 1 as COM 1 and serial port 2 as COM2
	COM1	Sets serial port 1 as COM1, disables port 2
	COM2	Sets serial port 1 as COM2, disables port 2
	Disabled	Disables both of the serial ports
Parallel	Uni-LPT1*	Sets parallel port as unidirectional LPT1
	Uni-LPT2	Sets parallel port as unidirectional LPT2
	Bi-LPT1	Sets parallel port as bidirectional LPT1
	Bi-LPT2	Sets parallel port as bidirectional LPT2
	Disabled	Disables the on-board parallel port
PS/2 mouse	Enabled*	Enables the PS/2 mouse port
	Disabled	Disables the PS/2 mouse port
On-B/D FDC	Enabled*	Enables the on-board diskette drive controller
	Disabled	Disables the on-board diskette drive controller
IDE HDC	Enabled'	Enables the on-board hard disk drive controller
	Disabled	Disables the on-board hard disk drive controller

Default setting

Setting the Password Options

SETUP lets you enter a new password or disable an existing password to control who can access your system. A second password option allows you to set a hot key to disable your keyboard and mouse until you enter your system password.

Entering a Password

Follow these steps to enter a password:

1. Select option 3, Set Password **options,** from the main menu.

2. Press [Pg Dn] until you see **New Install** displayed for the **Password** state option. The cursor moves to the **Enter password** option field.

3. Enter the password you want to use and press [Enter]. The password can be up to eight characters and/or numbers. As you type the password, the screen displays an asterisk for each character you type.

4. The cursor moves to the second Enter **password** option field. Type your password again and press [Enter].. You again see an asterisk for each character you type.

   When you type the same password choice, you see the message:

   Correct! password installed

5. As you exit SETUP, make sure you save the new settings. When the system reboots, you will see the password prompt.

Changing or Deleting a Password

If you want to change **your password,** follow the same steps as to enter a new password. When the cursor is at the **Enter password** option, type the new password you want to use.

To delete a password, select **Not Installed** for the **Password** state option.

Whenever you delete your password using **SETUP, make** sure **you** save the new **settings** as you exit the SETUP program.

Setting the Keyboard Lock Option

SETUP provides another level of security for your system in the keyboard lock function. Once you have set a password for your system, you can also set a hot key that, when you press it, locks the keyboard and mouse until you enter your password again.

Follow these steps to define the hot key for your keyboard lock option:

1. On the password setup screen, move the cursor to the **Hot key state option.**

2. Press [Pg Dn] until **you see New Install.** The cursor moves **to** the **Enter** ' **Hot key'** option field.

3. Enter a letter or a number and press [Enter]. This identifies the key you want to press together with [Ctrl] and [Alt] as the hot key to lock your keyboard.

4. As you exit SETUP, make sure you save the new settings. When you press the hot key you've defined, the keyboard and mouse lock until you enter your password.

Using the System Board Help Function

SETUP provides a system board help function that contains a diagram of your system board in addition to the following information:

- DIP switch settings
- Jumper settings
- Identification of connectors
- Correct SIMM configurations
- External cache configurations
- Hard disk drive types
- System key combinations.

To use this help function, select option 4, Display system board help, from the main menu. Use the arrow keys to scroll through the options. You see the help information for the selected option in a window at the lower right corner of the screen.

Loading Default SETUP Values

You can load the default SETUP values at any time by selecting option **5, Load default SETUP values.** Whenyouselect this option, you see this message:

```
Load BIOS setup default values (Y/N)?
```

Press Y, then Enter to load the default values. If you don't want to load the default values, press N, then Enter. You can select another option from the SETUP main menu, or exit SETUP.

Saving Your Settings and Exiting SETUP

When you leave SETUP, you can either save the settings you have changed or exit the program without saving any changes.

To save your settings, follow these steps:

1. Press [Esc] to return to the main SETUP menu.

2. Select option 6, **SAVE** settings and exit, and press [Enter. You see this message:

   Write **to CMOS RAM and exit (Y/N)?**

3. Press [Y] and [Enter]. The system reboots.

4. If you have just run SETUP for the first time, see "Post-SETUP Procedures," below.

To exit SETUP without saving the setting, select option 7, Exit without saving settings. The system reboots with your original settings.

> **Note**
> If your computer detects a problem in your SETUP configuration, you may see an error message and a prompt to run SETUP when it is rebooting. Follow the instructions on the screen to run SETUP and correct the problem.
>
> You may also see an error message when your computer is rebooting if you have not installed your operating system on the hard disk and you did not insert a system diskette in drive A. If you receive this error message, follow the instructions in your operating system manual to install it.

Post-SETUP Procedures

If you have just run SETUP for the first time and your system has not been configured, you now need to install the operating system on your computer. See your operating system manual for instructions.

After you have installed your operating system, you can install any software you plan to use. See your application program manuals for instructions.

The VGA Utilities diskette contains special drivers to enhance the display capabilities of your built-in VGA adapter with certain applications. If you want to install these drivers, see the readme file called VGADRV.TXT in the root directory of the VGA Utilities 1 diskette. To print this file, enter the following command at the DOS prompt:

```
COPY A:VGADRV.TXT LPTl
```

If your computer came configured with a hard disk, the README file may already be loaded on the hard disk. You can access it by loading Windows and clicking on the VGA Utils group icon. Then select the README file icon.

Chapter 3

Using Your Computer

This chapter briefly describes the following operations:

- Working comfortably
- Using disks and disk drives
- Using special keys on the keyboard
- Stopping a command or program
- Resetting the computer
- Using a password
- Using the hot key feature
- Changing the processor speed.

Working Comfortably

This section provides tips for creating a comfortable work environment. Following these guidelines for good posture, work habits, and workstation layout can help you avoid problems such as muscle aches, eyestrain, and fatigue.

Sitting at Your Computer

When you use the computer, try to keep your elbows, hips, and knees bent at approximately 90 degree angles and keep your wrists as close to horizontal as possible. (Your hands, forearms, and thighs should be horizontal and your upper arms and lower legs should be vertical.) Your feet should rest firmly on the floor or a footrest.

An adjustable chair allows you to customize your workstation for your body so you can maintain the right posture. To avoid back problems, make sure your chair supports your lower back. Padded armrests let you rest your arms as you work.

To reduce neck strain, keep source documents on a copy stand and position the stand next to the screen at the same eye level.

Work in a relaxed, natural, upright position and let the chair support you. Your elbows should be near your body and level with or slightly lower than the keyboard so your hands rest lightly on the keys. To help you keep your wrists straight, the slope of the keyboard should be no more than 25 degrees. Try not to hit the keys too hard; using too much force creates tension in your hands. Also leave enough room on your work surface so you can freely move the mouse (or other pointing device), and be sure to rest your hands occasionally.

Varying Your Posture and *Movements*

While sitting at the computer, try to vary your posture and movements. Your seat and backrest should be wide enough and there should be enough room under your desk so that you can sit in a variety of positions throughout the day.

Be sure to occasionally stop working at your computer and perform other tasks. Also take periodic breaks; stand up, stretch, and move around.

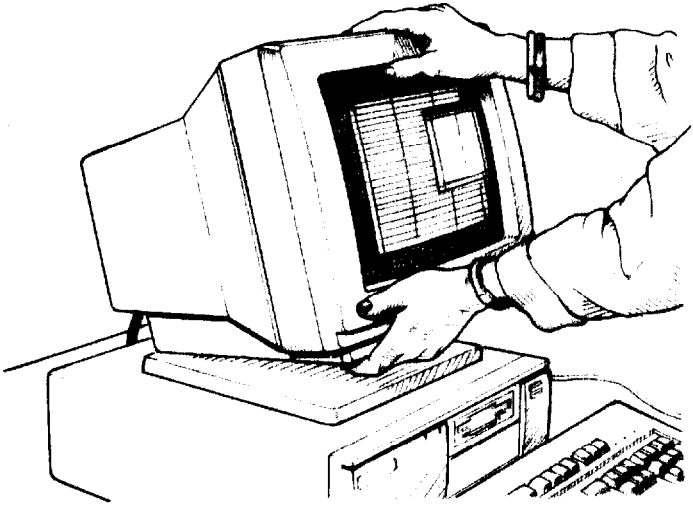
Lighting the Room

While it is important to have adequate lighting in your work area, make sure it is not too bright. When a light source is very bright, your eyes get tired by having to continually readjust between the relative dimness of the screen and the bright surroundings. It is best to control the amount of daylight that enters the room and keep bright light sources out of your field of vision when you are looking at the screen.

Positioning and Viewing the Monitor

Place the monitor directly in front of you and sit about an arm's length away from it. To minimize glare and reduce eye fatigue, position the monitor so that sunlight, desk lamps, and overhead lights do not shine directly on the screen.

When you are sitting in front of the monitor, the top of the screen should be slightly below eye level so you look down, rather than up, at the screen. If your monitor is too low, you can raise it by placing it (or the computer) on a stand. If the monitor has a tilt and swivel base, you can use it to adjust the position of the screen for comfortable viewing.



To produce an image that is clear and easy to look at, adjust the monitor's brightness and contrast controls. If your screen flickers, you can minimize it by selecting a dark background using either the brightness and contrast controls or your software.

To prevent eyestrain, rest your eyes occasionally by closing them or focusing on a fixed spot in the distance.

Using Disks and Disk Drives

The disk drives in your computer allow you to store data on disk, and then retrieve and use your stored data. This section tells you how to:

- ❑ Choose the right diskettes for your drive
- ❑ Write-protect diskettes
- ❑ Insert and remove diskettes
- ❑ Use a single diskette drive system
- ❑ Format diskettes
- ❑ Make backup copies
- ❑ Care for diskettes
- ❑ Use a hard disk drive.

Types of Diskette Drives

Your system supports the following types of diskette drives:

- ❑ 1.44MB, 3.5-inch
- ❑ 1.2MB, 5.25-inch
- ❑ 72OKB, 3.5-inch
- ❑ 360KB, 5.25-inch
- ❑ Dual 1.44MB, 3.5-inch and 1.2MB, 5.25-inch.

Note
MB stands for megabyte, which equals 1024KB (or 1,048,576 bytes). KB stands for kilobyte, which equals 1024 bytes. Each byte represents a single character, such as A, $, or 3.

If your computer has more than one type of diskette drive, or if you use different types of diskettes, you need to be aware of certain incompatibilities between the drives and diskettes. See the following tables.

3.5-inch drive/diskette compatibility

Drive type	Diskette types it can read from and write to
720KB	720KB
1.44MB	1.44MB, 720KB

5.25-inch drive/diskette compatibility

Drive type	Diskette types it can read from and write to
360KB	360KB. 320KB. 180KB. 160KB
1.2MB	1.2MB. 360KB,* 320KB,* 180KB,* 160KB*

If you write to this diskette in a 1.2MB drive, you may not be able to read it or write to it in a 360KB drive later.

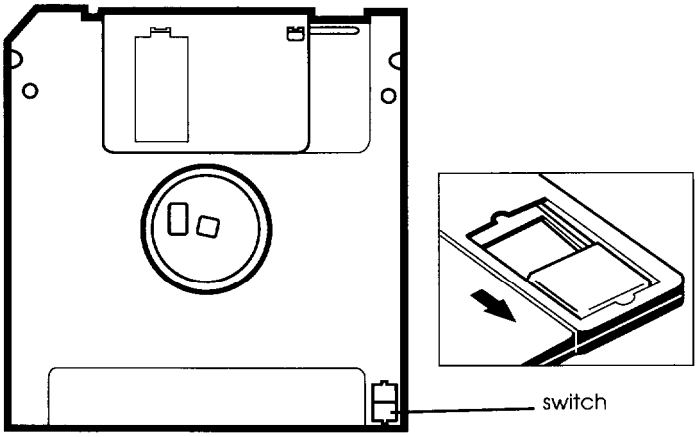
Because of possible incompatibilities, always label your diskettes with the diskette type and density. (Usually this information appears on the manufacturer's label.)

Note
If you want to format a 720KB diskette in a 1.44MB drive or a 360KB diskette in a 1.2MB drive, make sure you include the correct parameter in your format command. (In Windows you need to select the drive capacity.) See your operating system manual for instructions.

Write-protecting Diskettes

You can write-protect a diskette to prevent its data from being altered. When a diskette is write-protected, you can read it and copy data from it, but you cannot store new data on it or delete any files it contains.

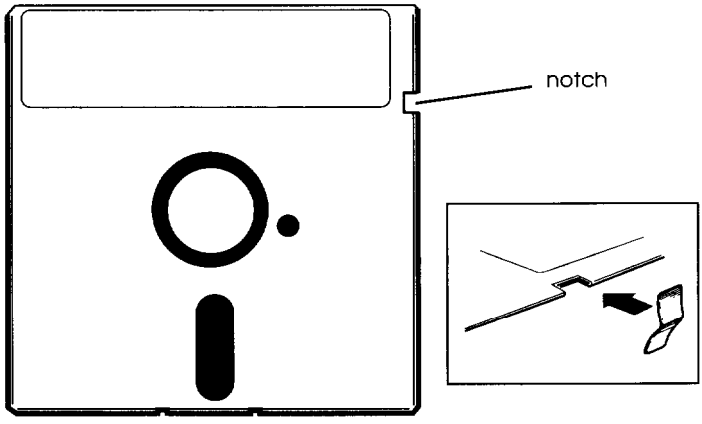
On a 3.5-inch diskette, the write-protect device is a small switch on the back of the diskette in the lower right corner, shown below. To write-protect a 3.5-inch diskette, slide the switch toward the edge of the diskette until it clicks into position, exposing a hole in the corner.



To remove the write protection, slide the switch toward the center of the diskette until it clicks into position and the hole is covered.

> **Note**
> A high-density 3.5-inch diskette has an additional hole on the opposite side. This hole does not affect the write-protection.

To write-protect a 5.25-inch diskette, cover the small, rectangular notch (shown below) with an adhesive write-protect tab. Write-protect tabs usually are included in a new package of blank 5.25-inch diskettes.

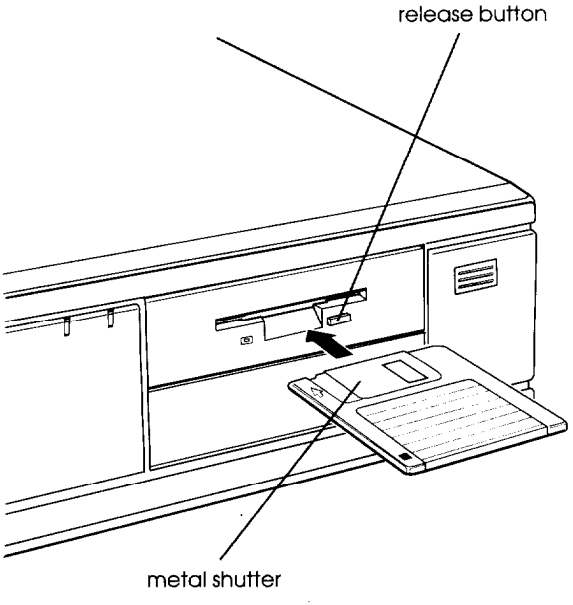


To remove the write protection, peel off the write-protect tab.

Note
Some program diskettes have no switch or notch so they are permanently write-protected. This protects them from being accidentally erased or altered.

Insertting and Removing Diskettes

To insert a diskette into a 3.5-inch drive, hold the diskette with the label facing up and the metal shutter leading into the drive, as shown in the following illustration. Slide the diskette into the drive until it clicks into place.



To insert a diskette into a 5.25-inch drive, hold the diskette with the label facing up and the read/write slot leading into the drive. When you want to remove the diskette, make sure the drive light is off; then press the release button or flip up the latch. When the diskette pops out, remove it and store it properly.

Caution
Never remove a diskette or reset or turn off the computer while a diskette drive light is on. You could lose data. Also, remove all diskettes before you turn off the computer.

Using a Single Diskette Drive System

Most operating systems expect the computer to have at least two diskette drives and display prompts and messages accordingly. MS-DOS, for example, recognizes the first diskette drive (the top drive) as drive A and a second diskette drive as drive B. If you have only one diskette drive, MS-DOS can treat it as both A and B when you need to perform operations that normally would use two diskette drives.

For example, if you enter a command to copy data from A to B, MS-DOS copies the data from the first diskette you place in the drive (which would be drive A) to the computer's memory. Then MS-DOS prompts you to insert another diskette (for drive B) and copies the data from memory to the new diskette. When copying is complete, you see a prompt to insert the original diskette (A).

Because you may often swap diskettes this way, it is important to remember which diskette is which. It is also a good idea to write-protect your original diskette. (See "Write-protecting Diskettes," on page 3-7.)

If you have a hard disk and one diskette drive, you can load the operating system and application programs from the hard disk, create and store your data there, and use the diskette drive just for copying data to or from diskettes.

However, if you have only one diskette drive and no hard disk, you need to use that drive to load the operating system as well as any application program you are using. First, insert the operating system diskette in drive A and load the operating system; this copies it to the computer's memory (RAM) so you do not need to leave the system diskette in the drive. Then remove the system diskette and insert your application program diskette to load that data into memory, too. See your application program manual for detailed instructions.

Formatting Diskettes

Before you can store data on a new diskette, you must format it. Formatting prepares the diskette so that the operating system can write data on it. You need to do this only once, before you use the diskette for the first time.

You can also reformat previously used diskettes to store new data. This process erases all the data on the diskette, so be sure you do not want to save any of the files on a used diskette before you format it. See your operating system manual for instructions on formatting diskettes.

Making Backup Copies

It is important to make copies of all your data and system diskettes. Make backup (or working) copies of all diskettes that contain programs, such as your operating system and VGA Utilities diskettes; then use only the copies. Store the original diskettes away from your working diskettes. Also, copy your data diskettes regularly, whenever you revise them, and store them away from your originals.

If you have a hard disk, you'll probably use it to store the programs and data files you use regularly. Keep backup copies of all your files on diskettes or tapes (if you have a tape backup drive).

Caring for Diskettes

Follow these simple precautions to safeguard your data and lengthen the life of your diskettes:

- Avoid leaving diskettes near magnetic fields that can erase the data, such as those generated by electric appliances or cordless telephones. Never place a diskette on top of your monitor or near the hard disk drive.

- Small particles of dust or dirt can scratch the magnetic surface, destroy data, and ruin the read/write heads in a diskette drive, so store diskettes in a diskette container away from dust and dirt.

- Extreme changes in temperature can also destroy data. Keep diskettes out of direct sunlight or extreme cold.

See your diskette packaging for other guidelines.

Using a Hard Disk Drive

Using a hard disk is similar to using a diskette. However, the hard disk provides several advantages:

- A hard disk can store many times more data than a diskette.

- Your computer can perform all hard disk operations faster.

- You can store frequently used programs and data files on the hard disk, eliminating the inconvenience of swapping diskettes to access different files.

The added storage capacity makes it easy to move back and forth between different programs and data files. However, because it is so easy to add programs and files to your hard disk, you may find yourself trying to organize hundreds of files.

Most operating systems let you keep related files together in directories and subdirectories so they are easy to find and use. See your operating system manual for instructions on managing your files and directories.

> **Note**
> A hard disk must be partitioned and formatted before you can use it. Be sure you have performed the procedures described in your operating system manual to prepare your hard disk for use.

Backing up the hard disk

While the hard disk is very reliable, it is essential to back up your hard disk files to diskettes or tapes in case you lose some data accidentally. Make copies of all your system and application program diskettes before copying the programs to the hard disk. Be sure to to back up your data files regularly to keep your backup diskettes or tapes up-to-date.

Curing for your hard disk

Follow these precautions to protect your hard disk drive from damage and to avoid losing data:

- Never turn off or reset the computer when the hard disk access light is on. This light indicates that the computer is copying data to or from the hard disk. If you interrupt this process, you can lose data.

- Never attempt to open the hard disk drive. The disk itself is enclosed in a sealed container to protect it from dust.

Special Keys on the Keyboard

Certain keys on your keyboard serve special functions when your computer is running your operating system or application programs, as described in the table below.

Special key functions

Key	Purpose
Tab	Moves the cursor one tab to the right in normal mode and one tab to the left in Shift mode.
Caps Lock	Changes the letter keys from lower- to uppercase; changes back to lowercase when pressed again. The numeric/symbol keys on the top row of the keyboard and the symbol keys in the main part of the keyboard are not affected.
Shift	Produces uppercase characters or the top symbols on the keys when used with the main character keys. Produces lowercase characters when the Caps Lock function is on.
Ctrl	Works with other keys to perform special (control) functions.
Alt	Works with other keys to enter alternate character codes or functions.
<-- Backspace	Moves the cursor back one space, deleting the character to the left of the cursor.
Enter	Ends a line of keyboard input or executes a command.
Insert	Turns the Insert function on and off.
Delete	Deletes the character marked by the cursor.
Home, End Pg Up, Pg Dn ↑, ← ↓, →	Control cursor location.
Esc	Cancels the current command line or operation.
Num Lock	Changes the function of the numeric/cursor keys from entering numbers to positioning the cursor.

Special key functions (continued)

Key	Purpose
F1 - F12	Perform special functions within application programs.
Print Screen (PrtSc)	Prints the screen display on a printer.
Sys Req (Req)	Generates the System Request function in some application programs (used with Alt).
Scroll Lock	Controls scrolling in some applications.
Pause	Suspends the current operation.
Break	Stops the current operation (used with Ctrl).

The Caps Lock, Num Lock, and Scroll Lock key work as toggles; press the key once to turn on a function and again to turn it off. When the function is enabled, the corresponding light in the upper right corner of the keyboard is on.

Stopping a Command or Program

You may sometimes need to stop a command or program while it is running. If you have entered an MS-DOS or application program command that you want to stop, try one of the following:

- Press Pause
- Hold down the Ctrl key and press C
- Hold down the Ctrl key and press Break.

If these methods do not work, you may need to reset the computer as described below. Do not turn off the computer to exit a program or stop a command unless you have to, because the computer erases any data you did not save.

Resetting the Computer

Occasionally, you may want to clear the computer's current settings or its memory without turning it off. You can do this by resetting the computer.

For example, if an error occurs and the computer does not respond to your keyboard entries, you can reset it to reload your operating system and try again. However, resetting erases any data in memory that you have not saved; so reset only if necessary.

> **Caution**
> Do not reset the computer to exit a program. Some programs classify and store new data when you exit them in the normal manner. If you reset the computer without properly exiting a program, you may lose data.

To reset the computer, the operating system must be either on the hard disk or on a diskette in drive A; so if you do not have a hard disk, insert the system diskette in drive A. If you are using MS-DOS, hold down Ctrl and Alt and press Delete. The screen goes blank for a moment and then the computer should reload your operating system.

If resetting the computer does not correct the problem, you probably need to turn it off and reboot it. Remove any diskette(s) from the diskette drive(s). Turn off the computer and wait 20 seconds. If you do not have a hard disk, insert the system diskette in drive A. Then turn on the computer.

Using a Password

If you set a system access password when you ran the SETUP program, you must enter it every time you turn on or reset the computer. Follow these steps to use your password:

1. If you do not have a hard disk, insert your system diskette in drive A.

2. Turn on or reset the computer. You see the following prompt:

   Enter **Password:**

3. Type your password and press Enter.

After you type the password correctly and press Enter, the computer loads the operating system and displays the command prompt.

> **Note**
> If you do not know the correct password, see "Password Problems" in Chapter 6.

Using the Hot Key Feature

Once you set a password, you can keep unauthorized users from accessing your system by using the hot key feature. This key combination (Ctrl + Alt + the key of your choice) temporarily locks your keyboard and mouse so you can secure your system without turning it off.

To use the hot key feature, follow these steps:

1. See Chapter 2 to set your password and define a hot key.

2. When you want to disable the keyboard and mouse, enter your hot key combination. The keyboard and mouse lock up and do not respond to typed entries or mouse movement.

3. To resume activity, type your password and press Enter.

Changing or Deleting a Password

To change or delete your password, you must run the SETUP program and follow the instructions for entering a password in Chapter 2.

If you do not know your password, see "Password Problems" in Chapter 6.

Changing the Processor Speed

Your computer's processor can operate at two speeds: fast or slow. Fast speed is the highest speed at which your microprocessor is capable of running, such as 25,33, or 50 MHz. Slow speed simulates an 8 MHz processor to provide compatibility with older application programs.

When your computer is operating at fast speed, the speed light on the front panel is green. When the computer is operating at slow speed, the light is amber.

You should use fast speed for almost everything you do because your programs will work faster. However, certain application programs have specific timing requirements and can run only at the slower speed. See your software manual to determine if this is the case.

If you want your computer to always start at slow speed, you can change the default setting through SETUP. See Chapter 2 for instructions.

Some copy-protected programs require the computer to run at slow speed while accessing the program on a diskette. These programs also usually require you to leave a key disk-the diskette that contains the copy protection-in the diskette drive. If you use a copy-protected program, you can change the speed to slow to access the diskette and return it to fast speed when you are finished.

You can change the processor speed temporarily by entering one of the following commands from the numeric keypad on your keyboard:

- To select slow speed, press Ctrl Alt –.
- To select fast speed, press Ctrl Alt +.

(Hold down the Ctrl key and the Alt key simultaneously and then press the + or – key on the numeric keypad.)

Note
You can use the commands listed above while you are running a program. However, if the program uses one of these commands for another function, you cannot use it to change the processor speed. You can, however, enter the command at the MS-DOS command prompt or change it through the SETUP program.

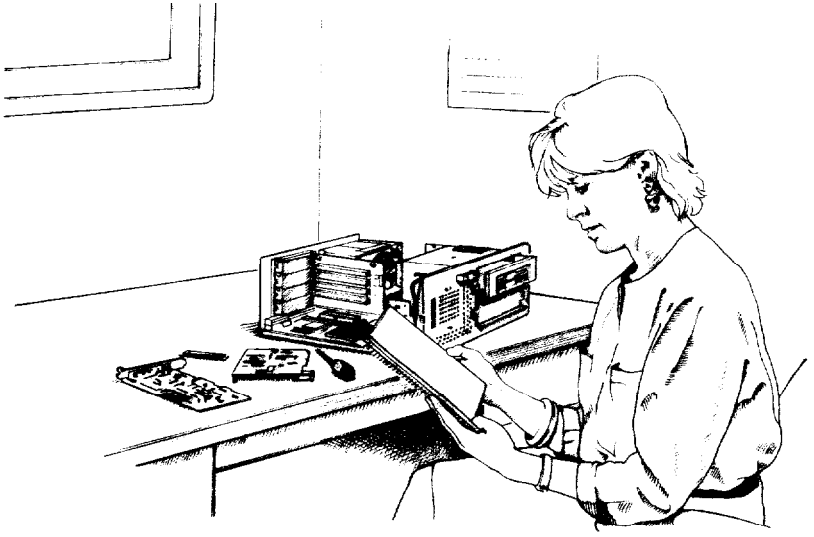
The speed setting remains in effect until you reset the computer, change the speed with a keyboard command, or change the speed using SETUP.

Chapter 4

Installing and Removing Options

You can enhance the performance of your computer by adding optional equipment such as memory modules, option cards, an Intel OverDrive processor or math coprocessor, or video memory.

This chapter describes how to install (and remove) these options, as well as how to change the jumper and DIP switch settings inside the computer. You may need to change these settings if you install options or if you want to change the way your system operates.



How to Use This Chapter

This chapter explains how to do the following:

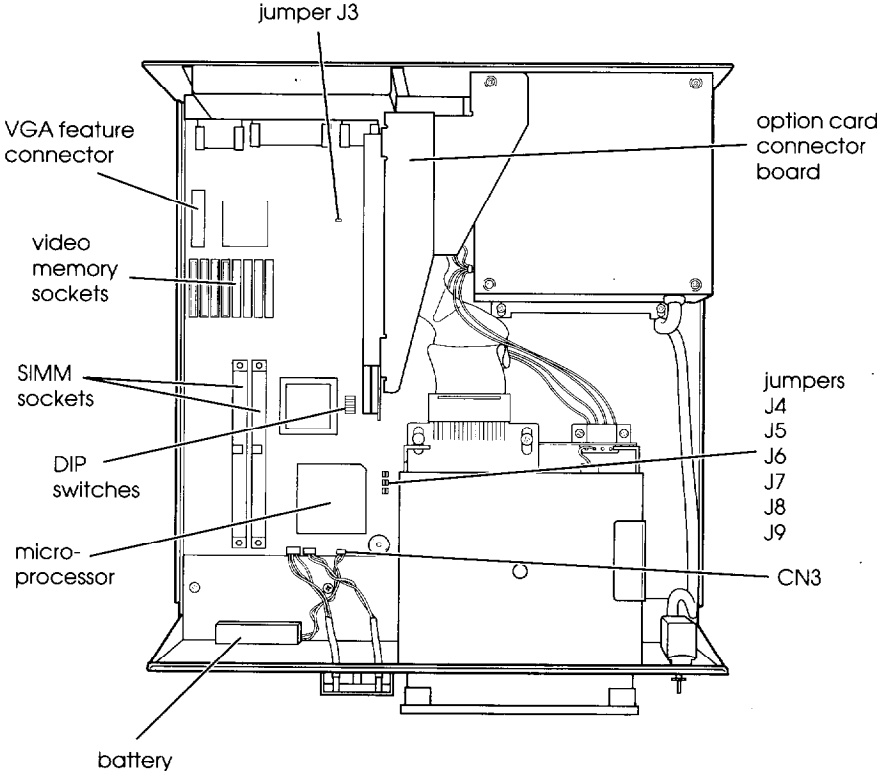
- ❑ Remove and replace the computer's cover
- ❑ Change jumper settings and DIP switch settings on the main system board
- ❑ Install and remove memory modules (SIMMs)
- ❑ Install and remove an option card
- ❑ Remove and replace the option card connector board
- ❑ Install a new processor chip
- ❑ Increase the video memory
- ❑ Use the VGA feature connector
- ❑ Replace the system battery.

Follow the steps in the first section to remove the cover, and then go to the appropriate section for the instructions you need. When you finish, see the instructions at the end of this chapter to replace the computer's cover.

> **Note**
> Your system also supports up to 256KB of extended cache memory; however, the system board must be removed from the computer to install the cache memory chips. If you want to add cache memory, contact your Authorized Epson Servicer or call the Epson Connection for a referral. Do not attempt to install cache chips yourself.

Locating the Internal Components

As you follow the instructions in this chapter, refer to the following illustration to locate the different components inside your computer.



Removing the Cover

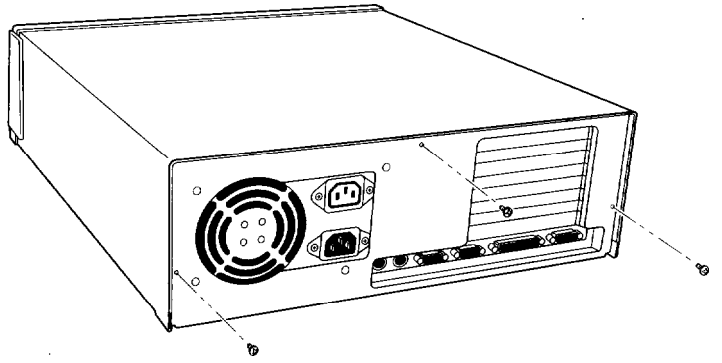
You need to remove the computer's cover to install any of the options described in this chapter or to install or remove a disk drive (as described in Chapter 5). Follow these steps:

1. Turn off the computer and then any peripheral devices (including the monitor and printer).

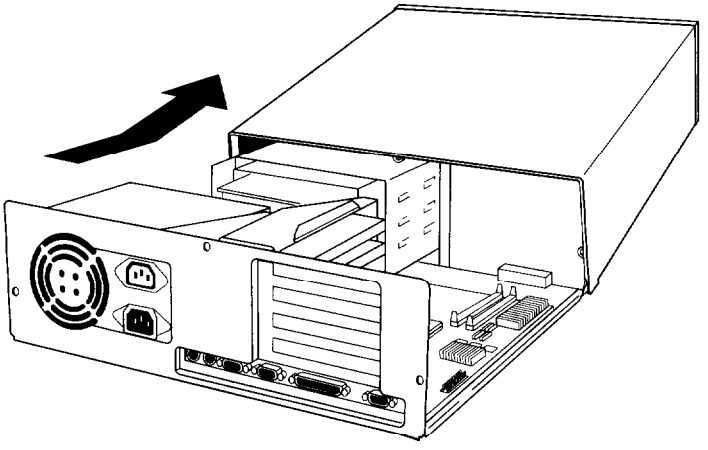
2. Disconnect the computer's power cable from the electrical outlet and from the back panel. Also disconnect any cables that are connected to the computer, including the keyboard and mouse cables.

3. If the monitor is on top of the computer, lift it off and set it to one side.

4. Remove the three screws securing the back panel, as shown below.



5. From the front of the computer, grasp the sides of the cover and pull it straight toward you until it stops, just before it reaches the front of the computer. Then lift it off at an angle as shown below.



6. Set the cover aside.

7. Ground yourself to the computer by touching the metal surface of the back panel.

> WARNING
> Be sure to ground yourself by touching the back panel of the computer every time you remove the cover. If you are not properly grounded, you could generate an electric shock that could damage a component when you touch it.

Changing the Jumper and DIP Switch Settings

The main system board in your computer has a number of jumpers and DIP (Dual Inline Package) switches. These devices control the operation of your system and provide configuration information to your CMOS ROM.

The jumpers control the following functions:

- Enable or disable the built-in VGA display adapter
- Specify the type of CPU installed
- Specify the amount of external cache.

The DIP switches control these functions:

- Specify a color or monochrome monitor
- Specify the type of CPU installed on your system board
- Enable or disable the password
- Select the processor speed.

Jumpers and DIP switches are preset at the factory to match your system's configuration, but you may need to change them when you install certain options or want to change some functions. The following tables list the jumpers and DIP switches inside your system.

Display adapter and CPU jumper settings

Jumper	Setting	Function
J3	A* B	Enable the built-in VGA adapter Disable the built-in VGA adapter so you can use a display adapter on an option card as your primary adapter
J4	A** B	Select DX or DX2 CPU Select SX CPU

* Factory setting ** Factory set according to system CPU

External cache jumper settings

Cache size	J5	J6	J7	J8	J9
0KB*	B	B	B	B	A
32KB	A	A	A	A	A
64KB	A	B	A	B	A
128KB	B	B	A	A	A
256KB	B	B	B	B	B

* Factory setting; change jumpers only if external cache chips are installed by servicer

DIP switch settings

Switch	Setting	Function
1**	ON OFF	33 MHz CPU speed 25 MHz CPU speed
2**	ON OFF	25 MHz CPU speed 33 MHz CPU speed
3**	ON OFF	CPU present in PGA socket CPU absent from PGAsocket
4	ON* OFF	Enable'password security feature Disable password security feature
5	ON* OFF	Select color monitor Select monochrome monitor

* Factory setting ** Factory set according to system type

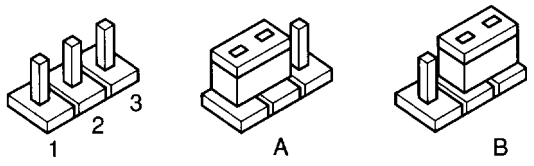
Setting the Jumpers

If you need to change any jumper settings, follow these steps:

1. Refer to the illustration on page 4-3 to locate the jumpers,

2. If there are any option cards installed, and you want to change the setting for jumper J3, you may need to remove the cards. See page 4-19.

3. A jumper's setting is determined by where the jumper is placed on the pins. For three pin jumpers, the jumper connects pin 1 and the middle pin (position A) or pin 3 and the middle pin (position B), as shown below.



In the off position, a three pin jumper sits on only one of the end pins. To move a jumper from one position to the other, use needle-nose pliers or tweezers to pull it off its pins and gently move it to the desired position.

> **Caution**
> Be careful not to bend the jumper pins or damage any surrounding components on the main system board.

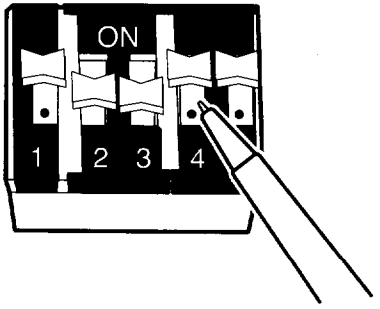
4. Replace any option cards you removed. See page 4-14 for instructions.

Setting the DIP Switches

If you need to change any of the DIP switch settings, follow these steps:

1. Locate the DIP switch block near the center of the system board, shown on page 4-3. The switches are numbered 1 through 5, and the ON position is marked on the block.

2. Use a pointed instrument, such as the tip of a pen, to turn a DIP switch on or off. The new setting takes effect the next time you turn on the computer.



3. Depending on which DIP switch you change, you may also need to run SETUP. For example, if you set DIP switch 4 to ON to enable password security, you then need to enter your password using **Set Password options** in SETUP. See Chapter 2 for instructions.

Memory Modules (SIMMs)

Your computer comes with 4MB of memory installed on the system board. By installing memory modules-also called SIMMs-you can increase the amount of memory in your computer up to 36MB.

There are two SIMM sockets on the main system board, and each can contain one memory module. You can install SIMMs with a capacity of lMB, 4MB, or 16MB.,The following table shows the possible SIMM configurations; do not install memory in any other configuration.

SIMM configurations

SIMM1	SIMM2	Total
0	0	4MB*
1MB	0	5MB**
4MB	0	8MB**
1MB	4MB	9MB**
4MB	4MB	12MB
16MB	0	20MB**
1MB	16MB	21MB**
4MB	16MB	24MB**
16MB	16MB	36MB

* Standard memory on the system board
** SIMMs can occupy either socket

Before you install SIMMs, check the following guidelines to ensure that they will work properly:

- Use only 36-bit, 72-pin, fast-page mode SIMMs that operate at an access speed of 70ns (nanoseconds) or faster. Be sure all the SIMMs operate at the same speed.

- Your computer can use any SIMM that complies with industry standards; however, it is best to use Epson SIMM option kits to ensure reliability and compatibility.

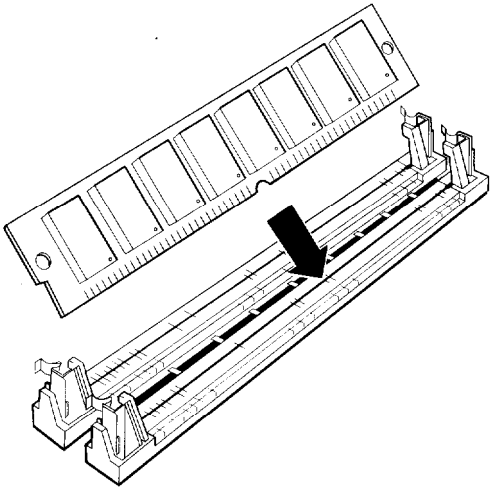
Inserting SIMMs

Follow these steps to install SIMMs:

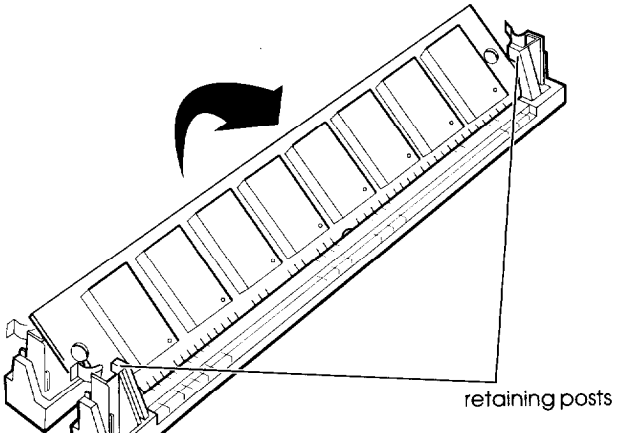
1. Refer to the illustration on page 4-3 to locate the SIMM sockets near the front of the computer.

2. Remove any option cards that may be blocking your access to the SIMM sockets. See page 4-19 for instructions.

3. Position the SIMM over the socket at an angle, as shown below. The components on the SIMM should face the outside of the computer.



4. Push the SIMM into the socket until it is seated firmly in the slot. Then tilt it upright, as shown below, guiding the hole at each end of the SIMM over the retaining post at each end of the SIMM socket.



If it does not go in smoothly, do not force it; pull it all the way out and try again.

5. Repeat steps 3 and 4 for the second SIMM, if necessary.

6. Replace any option cards you removed. See page 4-14 for instructions.

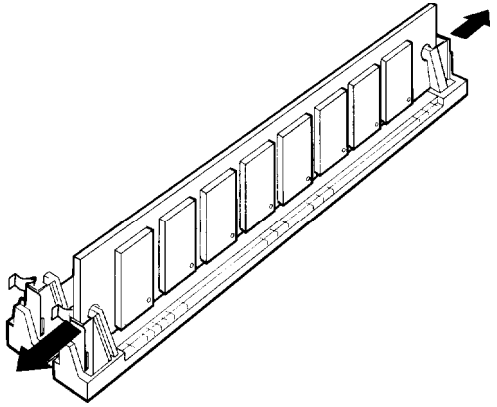
7. The next time you turn on your computer, run the SETUP program so your computer can update its configuration information with the new memory. See Chapter 2 for instructions.

Removing SIMMs

If you need to remove SIMMs from your computer (to install different ones, for example), follow the steps below.

1. Remove any option cards that may be blocking your access to the SIMM sockets. See page 4-19 for instructions.

2. Use your fingers or a small screwdriver to carefully release the metal tabs that secure the SIMM at each end. As you release the tabs, the SIMM falls to the side. Remove it from the socket.



3. If necessary, follow the same procedure to remove the other SIMM.

4. Replace any option cards you removed as described on page 4-14.

5. The next time you turn on your computer, run the SETUP program so your computer can update its memory configuration.

Installing an Option Card

This section explains how to install an option card in your computer. Your computer has four option slots to accommodate up to four 8-bit or 16-bit option cards.

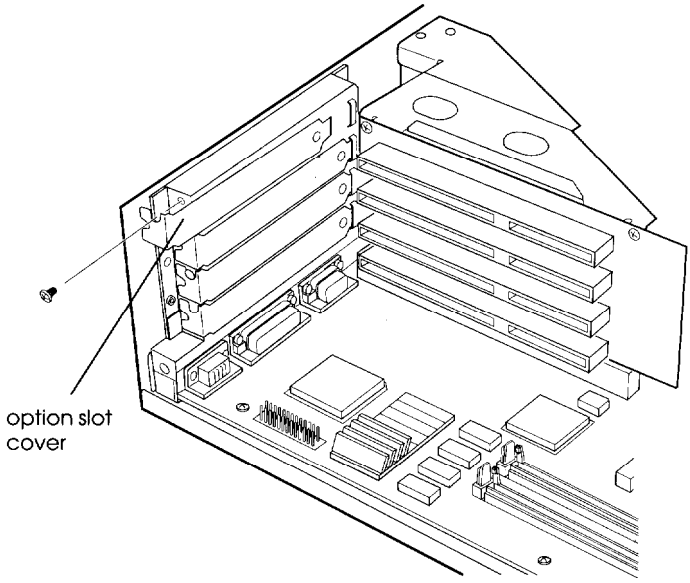
Usually it does not matter which slot an option card occupies as long as the card fits in the slot. For example, you can place some 8-bit cards in a 16-bit slot. However, follow these guidelines when deciding which slot to use:

- If you are installing a display adapter card, make sure any switches or jumpers on the card are set properly. See the documentation that came with the card for instructions.
- If you installed SIMMs, the bottom slot (slot 1) will accommodate only an 8-bit card.
- If you are using a CGA adapter and monitor, you also need to set the **Primary display** option in SETUP to Color 80x25 or Color 40x25. See Chapter 2 for instructions on running SETUP.
- If you are installing a high-resolution graphics adapter card, follow the instructions below to install the adapter card; then see "Using the VGA Feature Connector" on page 4-17 to connect the card to the VGA feature connector on the main system board.

> **Note**
> Before you install an option card, see if you need to change any jumper settings or DIP switches on the system board. For example, if you install a video card, you may need to change jumper J3. See page 4-6.

Follow these steps to install an option card:

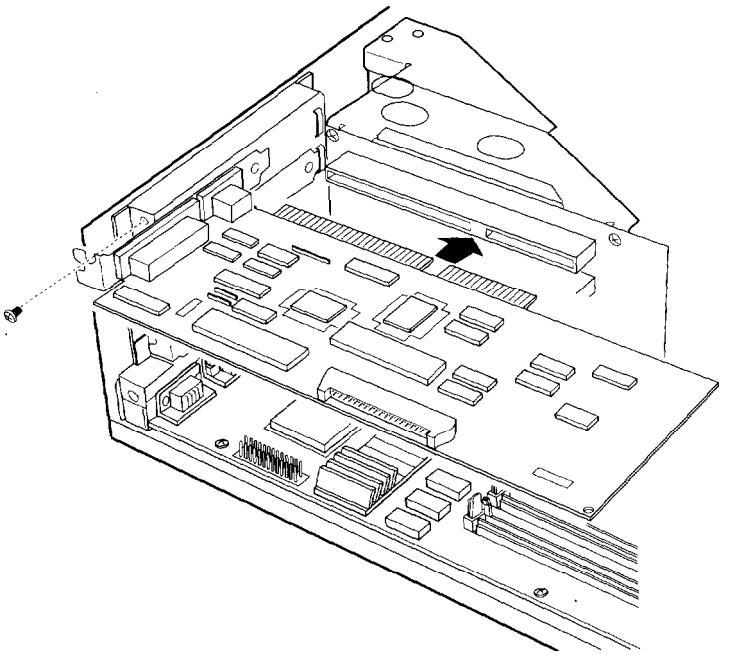
1. If you are installing a card in the option slot for the first time, you need to remove the metal cover for that slot on the inside back panel. Remove the retaining screw securing the option slot cover to the computer. (Keep the screw to secure the option card to the computer.)



2. Slide out the slot cover and set it aside. (Store the slot cover in a safe place in case you remove the option card later.)

3. Unpack the option card and adjust any switches or jumpers on it, if necessary. (Check the option card instructions.) When you handle the card, do not touch any of the components on the circuit board or the gold-edged connectors. If you need to set it down before you install it, place it gently on top of its original packing material with the component side facing up. Keep the packing materials in case you remove the card later.

4. Hold the card along the top corners and guide it into the connector, as shown below.



Once the connectors reach the slot, push the card in firmly (but carefully) to insert it fully. You should feel the card fit into place. If it does not go in smoothly, do not force it; pull the card all the way out and try again.

5. Secure the end of the card to the computer with the retaining screw.

Using the VGA Feature *Connector*

Your computer includes an alternate VGA interface (feature connector) on the main system board. If you install a high-resolution graphics or a full-motion, multi-media adapter card in one of the computer's option slots, this connector allows you to access the standard VGA signals provided by your system circuitry.

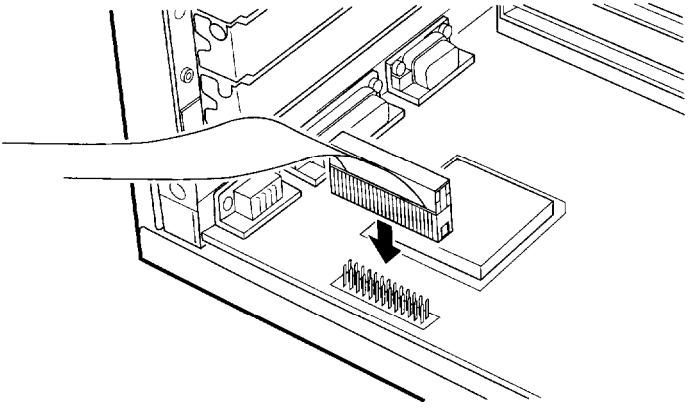
Typically, high-resolution graphics adapter cards increase the graphics processing performance of your VGA monitor and provide resolutions of more than 1024 x 768. They are useful for high-end graphics applications such as AutoCAD® or Windows.

> **Note**
> You must increase your video memory to 1MB before you can use a high-end graphics card. See "Increasing the Video Memory" on page 4-25 for information.

To connect the adapter card interface to the VGA feature connector on your main system board, locate the VGA feature cable included with your computer. Then follow these steps:

1. If you have not already done so, follow the instructions on page 4-14 ("Installing an Option Card") to install the graphics adapter card in your computer.

2. Attach one end of the feature cable to the alternate VGA interface on the main system board near the back panel, as shown below. Align the cable so the red wire along one edge is closest to pin 1 in the socket.

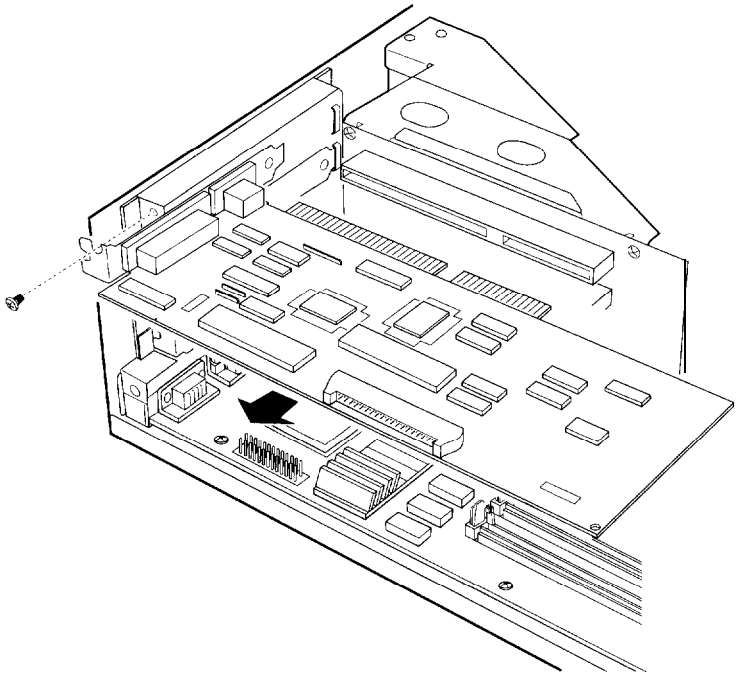


3. Connect the other end of the cable to the appropriate interface on the adapter card. (Check your graphics card manual for instructions.)

Removing an Option Card

You may need to remove an option card installed in your computer to access components on the main system board-to change a jumper setting, for example. You may also want to remove a card if you no longer need it. Follow these steps:

1. Remove the retaining screw securing the option card to the computer. Then pull the card straight out of the slot.



2. Set the card aside with the component side facing up.

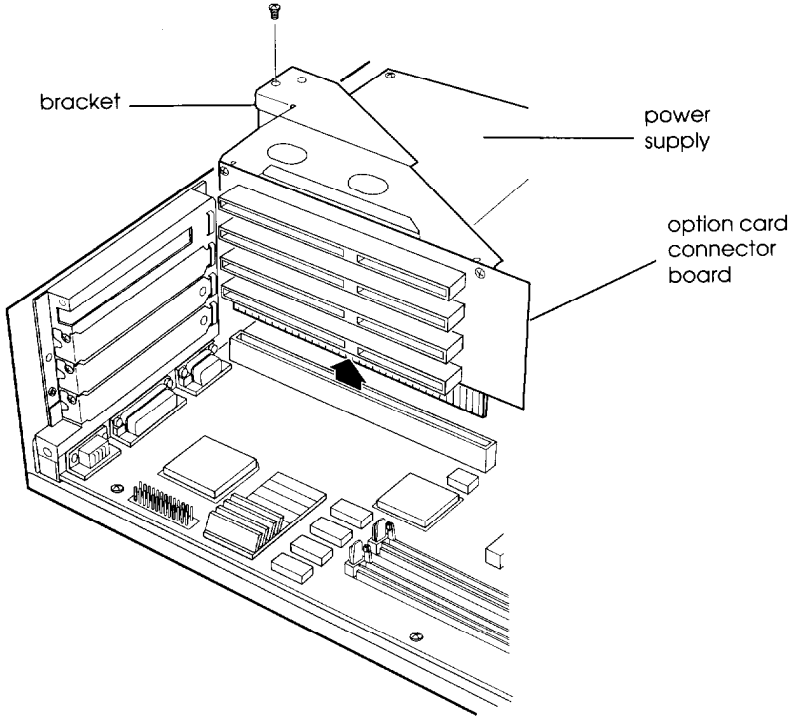
When you are ready to re-install the option card, see page 4-14 for instructions.

Removing the Option Card Connector Board

You may want to remove the option card connector board to access certain components on the main system board, such as the disk drive controllers. Follow these steps:

1. Remove any option cards. (See the instructions above.)

2. Remove the retaining screw securing the bracket on the option card connector board to the power supply.



3. Pull the board straight up and out of its socket and set it aside.

Replacing the Option Card Connector Board

If you removed the option card connector board to access any system components, refer to the illustration on page 4-14 as you follow these steps:

1. Position the board above its slot and then firmly push it straight in.

2. Secure the board to the power supply with its retaining screw.

Now you can re-install any option cards you removed. See page 4-14 for instructions.

Installing a New Processor Chip

You can enhance your 25 MHz or 33 MHz system's performance by installing an Intel OverDrive processor. Alternatively, for the 25 MHz system, you can install a 487SX microprocessor with a built-in math coprocessor.

An OverDrive processor is a CPU chip which doubles the internal processing speed of the microprocessor and includes a built-in math coprocessor. A math coprocessor is an optional microprocessor for 486SX systems that allows them to perform some mathematical functions faster.

Complete instructions for installing the processor are provided in the manual that comes with it. Please follow those instructions carefully, along with the following guidelines:

- Although the OverDrive processor User's Guide instructs you to remove the main system board from the computer, this is not necessary. You can leave the board inside the computer case while you install the processor.

- Refer to the illustration on page 4-3 to locate the microprocessor socket on the system board. You can install the OverDrive processor (or 487SX chip) directly in this socket; however, you need to remove the current microprocessor first. To remove the microprocessor chip, follow the instructions in the next section.

- When you install an OverDrive processor, you need to change the jumper setting of J4 to position A.

- After you install the processor and replace the computer's cover, run the SETUP program so your computer can update its configuration. See Chapter 2 for instructions. (You need only run the program and save the configuration; you do not need to change any settings.)

Replacing the Processor Chip

If you need to remove the existing microprocessor chip to replace it with a math coprocessor or OverDrive chip, follow these steps:

1. Use the illustration on page 4-3 to locate the processor socket on the system board.

> **Caution**
> Make sure you ground yourself by touching the metal surface on the inside of the computer's back panel before you touch the processor chip. Then remain as stationary as possible while you install it. Do not touch the pins on the processor chip. Handle the processor only by the edges of its case.

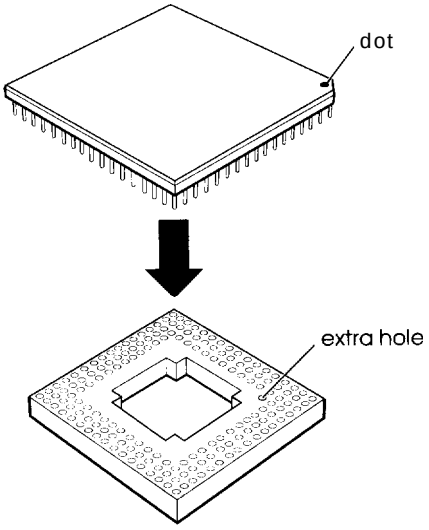
2. If you use a chip puller, position the puller between the processor chip and the socket.

   You can also use a small, flat-edged screwdriver instead of a chip puller. Carefully wedge the tip of the screwdriver between the processor chip and the socket. Gently turn the screwdriver until the chip begins to separate from the socket. Move the screwdriver to another side of the processor chip and again turn it until the chip separates from the socket. Keep doing this until you can lift the processor chip straight up from the socket.

3. Gently pull the processsor chip straight up and set it aside.

4. Remove the replacement chip from its package and inspect the pins. If they are bent, do not install the processor chip. Return the chip to the place of purchase and ask for a replacement.

5. Position the processor chip over the socket, making sure the notched edge of the chip (marked with a dot) aligns with pin 1 (the extra hole) on the socket, as shown below.



6. Make sure the pins in the processor chip are directly over the holes in the socket. Then gently push the processor straight into the socket, pressing evenly on all sides.

7. Check the tables on page 4-7 to see if you need to change any jumper or DIP switch settings for the processor you are installing.

Increasing the Video Memory

Your computer comes with at least 512KB of video memory. You can increase the video memory to 1MB by installing four 256K x 4-bit DRAM, 20-pin, ZIP (Zig-zag Inline Package) chips. This is useful for running graphics-intensive applications or for supporting resolutions up to 1024 x 768 or more on your monitor.

The following table lists the video DRAM ZIP chips that you can install on the main system board.

Supported video ZIP chips

Manufacturer	Part number
Goldstai®	GM7 1 C4256AZ-70
Micron®	MT4C42562-6, MT4C4256Z-7
Samsung®	KM44C256CZ-6, KM44C256CZ-7

Installing the Video Memory Chips

You need four ZIPs to install the optional memory. For the memory to work properly, you must install one chip in each of the empty video memory sockets on the system board. Follow these steps:

1. Locate the memory chip sockets on the main system board, shown on page 4-3. The chip sockets you'll use are the empty ones, numbered VMOO through VM03.

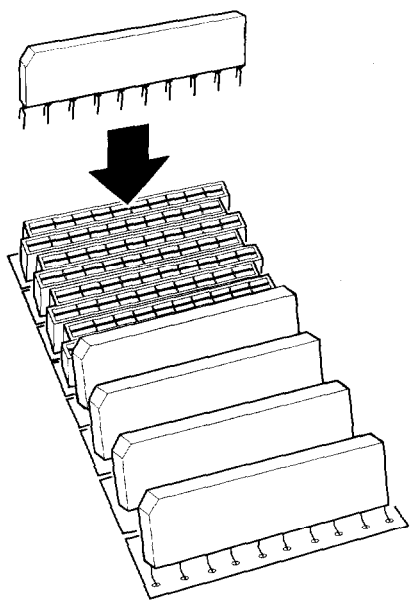
2. If there is an option card in your way, remove it. See page 4-19 for instructions.

Caution
To avoid generating static electricity and damaging the memory chips, ground yourself by touching the metal surface on the inside of the computer's back panel. Then remain as stationary as possible while you install them.

3. Remove the memory chips from their package and inspect each one. The pins should point inward at slightly less than a 90° angle.

   If any of the pins are bent, straighten them gently with your fingers or with small tweezers to align them with the other pins. Be careful when you do this; the pins are fragile and can break off easily.

4. Position one of the ZIPs over the first socket (VM03) as shown below, aligning the pins on the chip with the holes in the socket.



5. Gently press the chip halfway into the socket (to make sure it is correctly aligned). If the chip does not go in smoothly, remove it and try again.

6. When the chip is properly positioned, push down firmly on both ends of the chip to make sure it is well-seated.

7. Repeat steps 4 through 6 for each of the three remaining chips.

8. Replace any option cards you removed. See page 4-14 for instructions.

9. Now run SETUP as described in Chapter 2 to enable your system to recognize the increased memory.

Replacing the Battery

Your computer comes with a 3.6 volt lithium battery that provides power for the real-time clock and the CMOS RAM. The real-time clock keeps track of the time for your computer, and the CMOS RAM stores the information about your system configuration that was saved by the SETUP program.

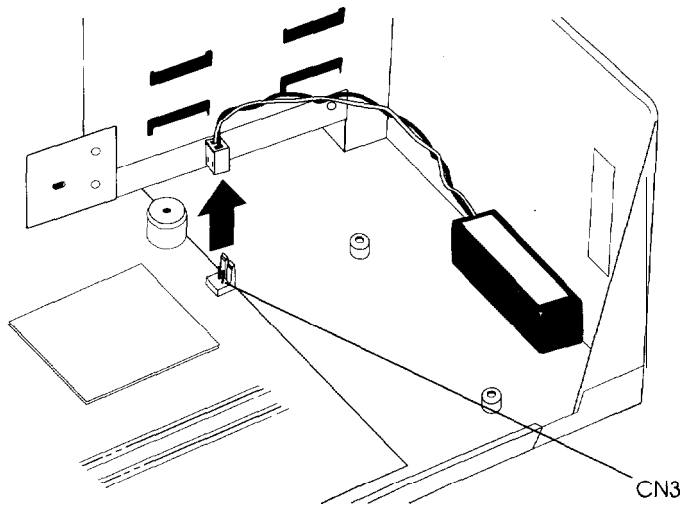
This battery lasts approximately three to five years. If it loses power, you see an error message when you turn on or reset your computer. Contact your Authorized Epson Servicer or Epson Accessories to get a replacement battery or to install the new battery for you. If you want to replace the battery yourself, follow the instructions in this section.

> **Note**
> When the battery loses power, your computer loses the information stored in the CMOS RAM and the time stored in the real-time clock. After you replace the battery, run the SETUP program as described in Chapter 2 to reconfigure your system and set the time and date.

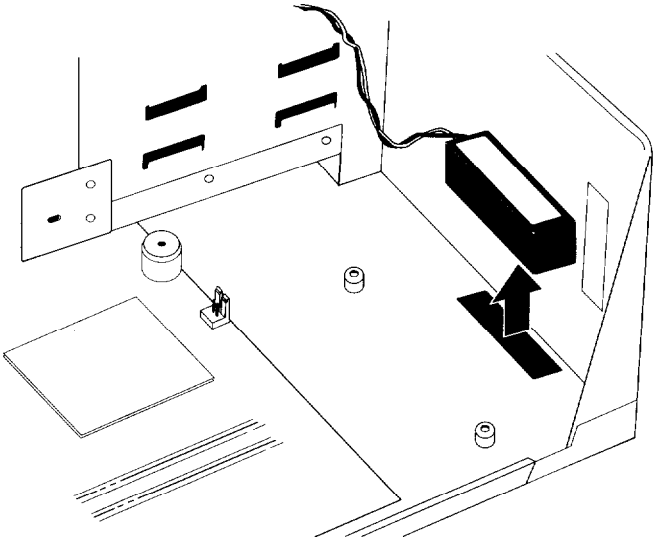
Follow these steps to replace the battery:

1. See the illustration on page 4-3 to locate the battery. It is attached to the base of the computer case, next to the drive bay.

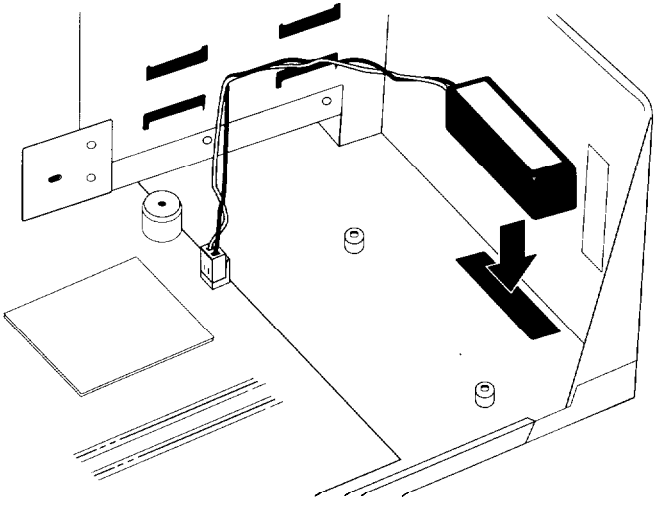
2. To disconnect the battery from the main system board, unplug the connector from socket CN3 (BAT), as shown below.



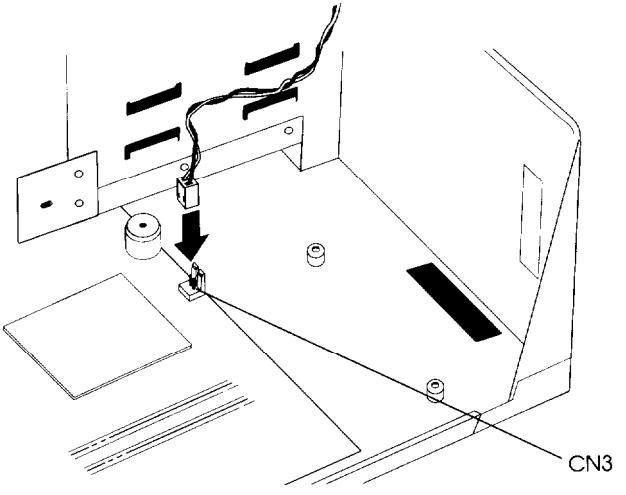
3. The battery is attached to the computer base with Velcro.® To remove it, pull it up from the bottom of the computer case, as shown in the following illustration. Then set it aside.



4. Remove the new battery from its package and position it so the Velcro faces down and the cable faces the power supply. Then push it down onto the bottom of the case.



5. Connect the battery cable to connector CN3.

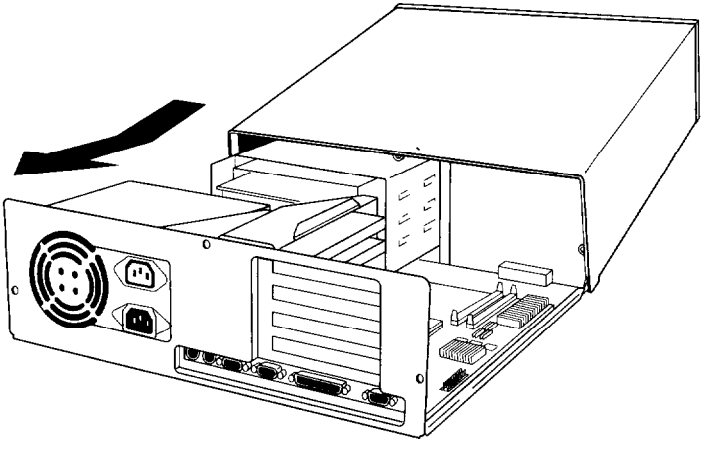


6. Follow the steps on page 4-31 to replace the computer's cover. Then run SETUP to reconfigure your system and reset the date and time for the real-time clock. See Chapter 2 for instructions.

Replacing the Cover

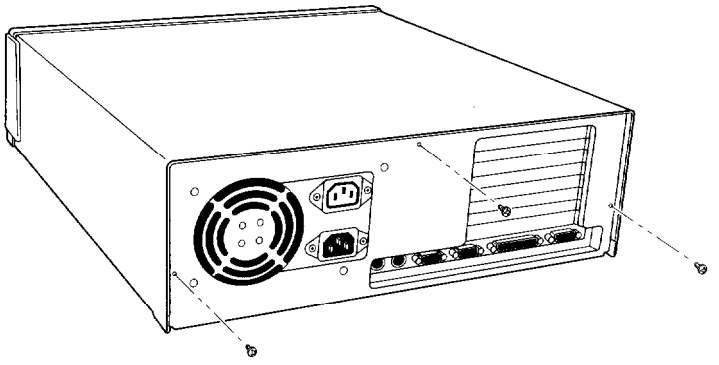
When you are ready to replace the computer's cover, follow these steps:

1. Facing the front of the computer, position the cover so the lip on its bottom edge slides under the guiderails along both sides of the computer case, as shown below.



2. Lower the cover and slide it straight back over the computer until it cannot go any farther.

3. Replace the three cover retaining screws, as shown below.



4. Reconnect the computer to the monitor, printer, keyboard, and any other peripheral devices you have. Then reconnect the power cable to the back of the computer and to an electrical outlet.

Post -installation Procedures

After you install or remove options such as memory modules or a new processor, you must run SETUP to update the computer's configuration. See Chapter 2 for instructions.

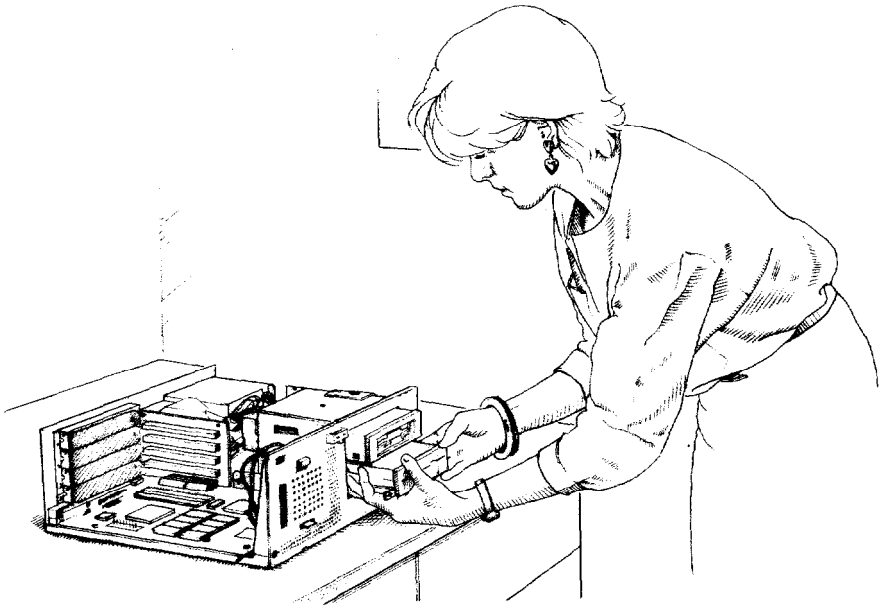
Additionally, you may need to add some commands to your configuration files. See your operating system manual and the manual that came with your optional equipment for instructions.

Chapter 5

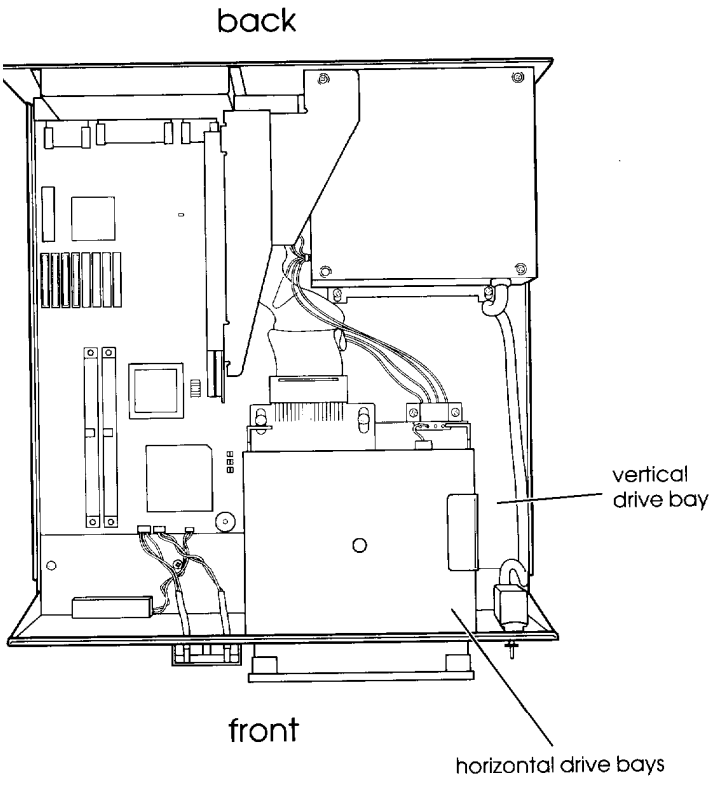
installing and Removing Drives

The instructions in this chapter describe how to install and remove optional Epson drives in your computer. You can use these instructions to install a variety of devices, including diskette drives, hard disk drives, a CD-ROM drive, or a tape drive. Although your drive may look different from the ones illustrated here, you should be able to install it the same way.

If you are installing or removing a non-Epson drive, some of the steps in this chapter may not apply; see the documentation that came with your drive for more information.



Your computer can hold up to three drives in two horizontal drive bays and one vertical drive bay.



The upper horizontal bay contains the diskette drive that came with your system. If your system came with only one diskette drive, you can install an additional device of one of the following types in the lower horizontal drive bay:

- 5¼-inch-wide diskette drive, dual diskette drive, tape drive, CD-ROM drive, or other storage device
- 3½-inch-wide hard disk drive with mounting frames attached to it.

Your computer may have a hard disk drive already installed in the vertical drive bay. If not, you can install one hard disk drive in this bay.

It is best to install your computer's first hard disk drive in the vertical drive bay. If you add a second hard disk drive or diskette drive, use the lower horizontal drive bay.

How to Use This Chapter

To install or remove a drive, first remove the computer's cover as described on page 4-4. Then see the table below for instructions you should follow next in this chapter.

To	See
Install a hard disk drive	"Setting the Hard Disk Drive Jumpers" on page 5-4
Install a diskette drive or other device in a horizontal drive bay	Page 5-16
Remove a diskette drive or other device from a horizontal drive bay	Page 5-26
Remove a hard disk drive from the vertical bay	Page 5-14

After you install or remove your drive(s), replace the computer's cover as described on page 4-31. Then see "Post-installation Procedures" on page 5-33 for additional steps you may need to perform.

Setting the Hard Disk Drive Jumpers

Most hard disk drives have jumpers that must be set for the drive to work properly with the computer. The jumpers tell the computer whether you are using one hard disk drive or two. If you purchased your computer with a hard disk drive already installed, these jumpers have been set correctly for your system.

If you install a hard disk drive in your computer, be sure to check the drive's jumper settings before you install it. See the documentation that came with your drive for the proper settings, then follow the instuctions below.

If you install a second hard disk drive, you must set the jumpers on both drives to indicate which drive is the *master* (primary) drive and which is the *slave* (secondary) drive. A master drive is the drive on which you'll install the operating system that the computer loads into its memory each time you turn it on. You can run application programs and store data on both the master and slave drive, but the operating system must be on the master drive.

Where to Go Next

To install a hard disk drive in the vertical drive bay, see the next section. To install a hard disk drive in the lower horizontal drive bay, see "Installing a Drive in a Horizontal Bay" on page 5-16.

Installing a Hard Disk in the Vertical Bay

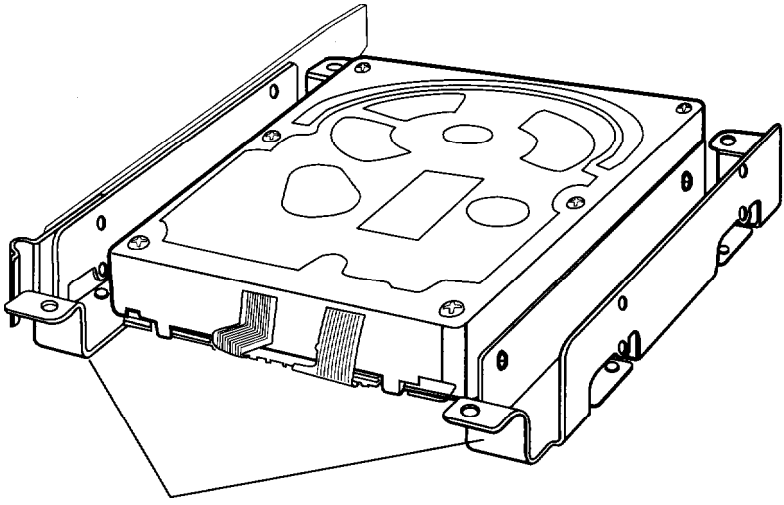
You should install your computer's first hard disk drive in the vertical drive bay. This section describes:

- Removing the mounting frames from the hard disk drive (if necessary)
- Installing the hard disk drive in the vertical drive bay
- Connecting the cables.

Before you install a hard disk drive, **be** sure to check the jumpers on the drive. For instructions, see page 5-4.

Removing the Mounting Frames

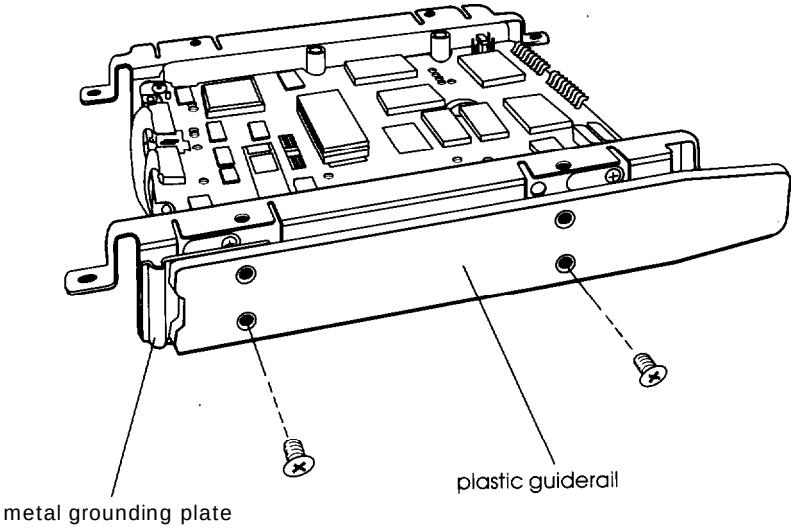
Your hard disk drive may have mounting frames attached to it, as shown below. You need to remove these frames before you can install the drive in the vertical bay.



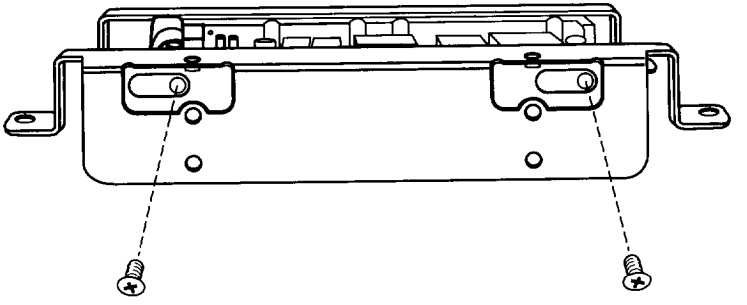
mounting frames

Follow these steps to remove the mounting frames:

1. On your hard disk drive, there may be a plastic guiderail and metal grounding plate attached to one of the mounting frames. If so, remove the screws securing them to the mounting frame, as shown below, and remove the guiderail and grounding plate.



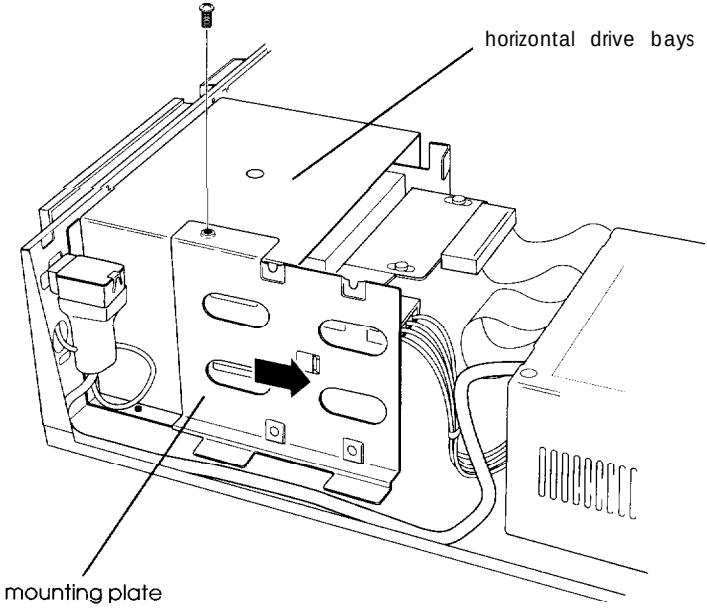
2. Then remove the two screws securing each mounting frame to the drive and remove the frames, as shown below.



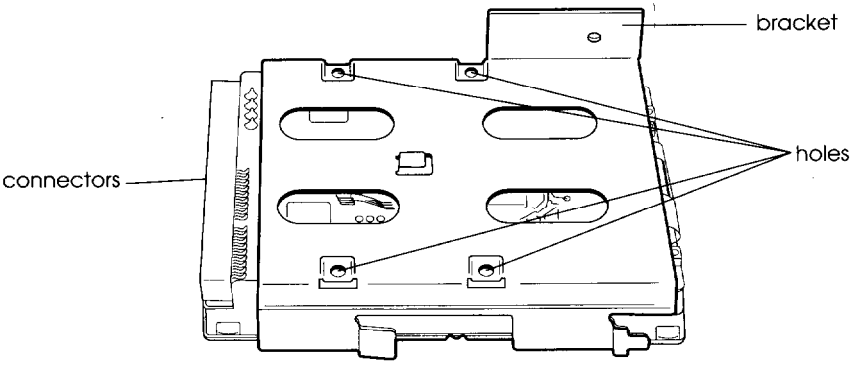
Installing the Hard *Disk*

To install the hard disk drive, you first need to attach it to the mounting plate in the vertical drive bay. Follow these steps:

1. Remove the screw securing the mounting plate to the horizontal drive bays and set it aside. Then slide the mounting plate in the direction of the arrow, and lift it out.



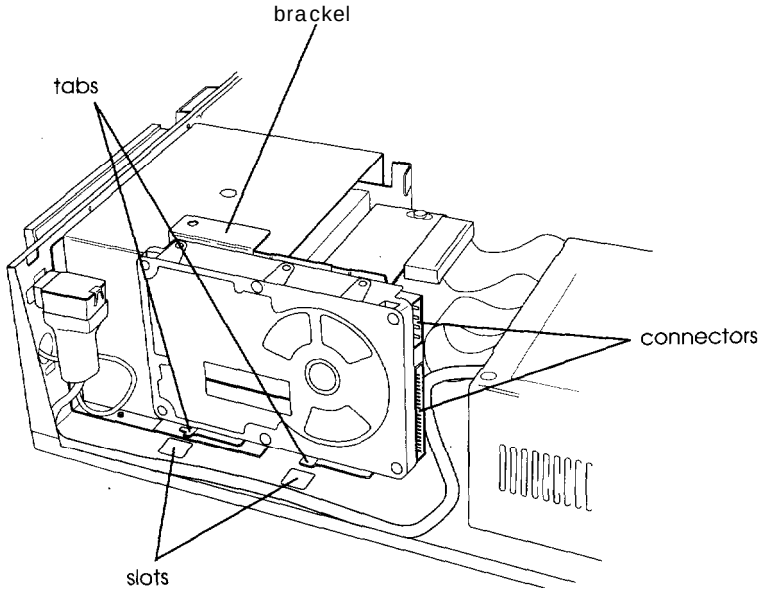
2. Turn the hard disk drive so the components face up and the connectors face left. Then place the mounting plate on the hard disk drive and align the four holes in the plate with the four holes in the drive, as shown below.



The bracket on the mounting plate should be on the opposite side of the connector end of the drive.

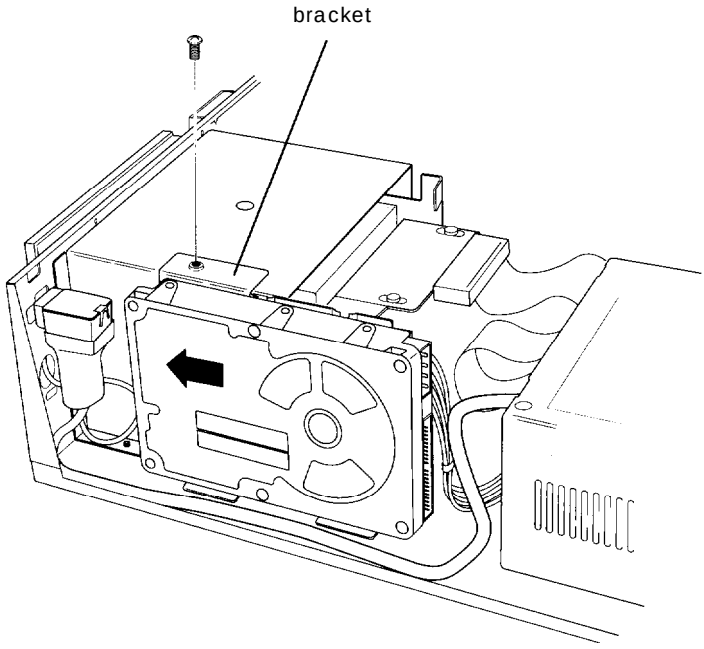
3. Use the four screws that came with the hard disk drive (or with your computer) to secure the mounting plate to the drive.

4. Hold the drive so the mounting plate faces the horizontal drive bays (with the bracket over the top) and the connectors face the back of the computer, as shown below.



The two tabs at the bottom of the mounting plate should be just above the two slots in the computer case.

5. Lower the tabs into the corresponding slots in the computer case. Slide the drive in the direction of the arrow, until the hole in the bracket is aligned with the hole on top of the horizontal drive bays.



6. Secure the mounting plate with the screw, as shown above.

Connecting the Cables

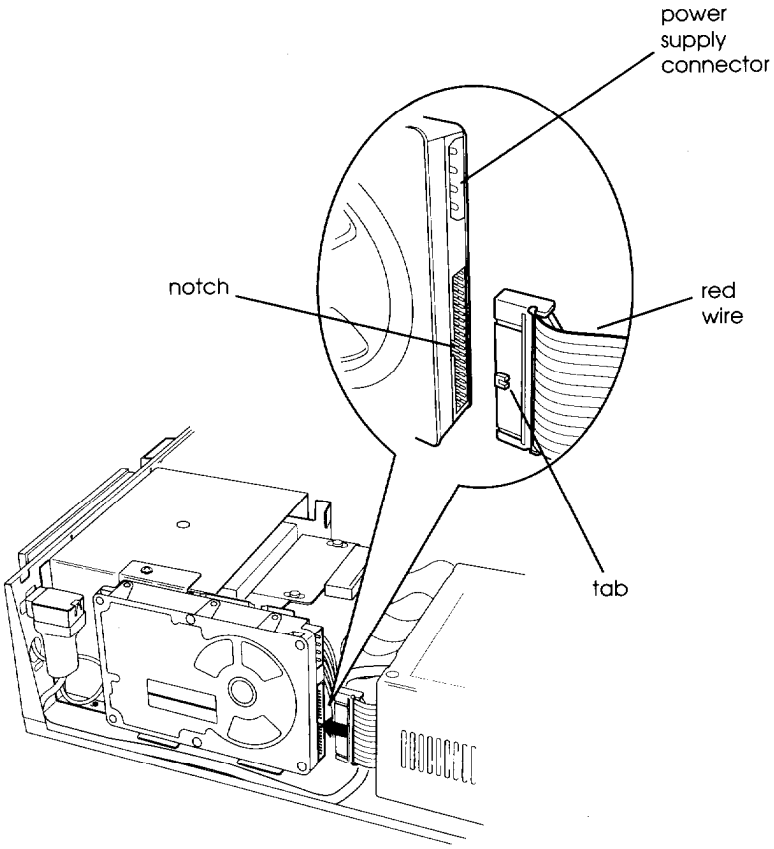
To connect the hard disk drive to the computer, you need to connect two cables: the hard disk drive ribbon cable and a power supply cable. Follow the steps below:

1. If you are installing your computer's first hard disk drive, you need to connect the hard disk drive ribbon cable to the system board now. Follow the instructions on page 5-30 and then return here.

2. The hard disk drive ribbon cable should be connected to the main system board. Locate the free connector on the end of this cable. (If there is a hard disk drive in the lower horizontal bay, the middle connector is attached to that drive.)

3. Notice the small tab in the middle of the cable connector; align this tab with the notch in the hard disk drive connector, as shown in the following illustration.

> **Note**
> When the hard disk drive ribbon cable is positioned correctly, the red wire on the cable aligns with pin 1 on the drive connector. To identify pin 1, look for a 1 or 2 at the connector on the drive's circuit board.

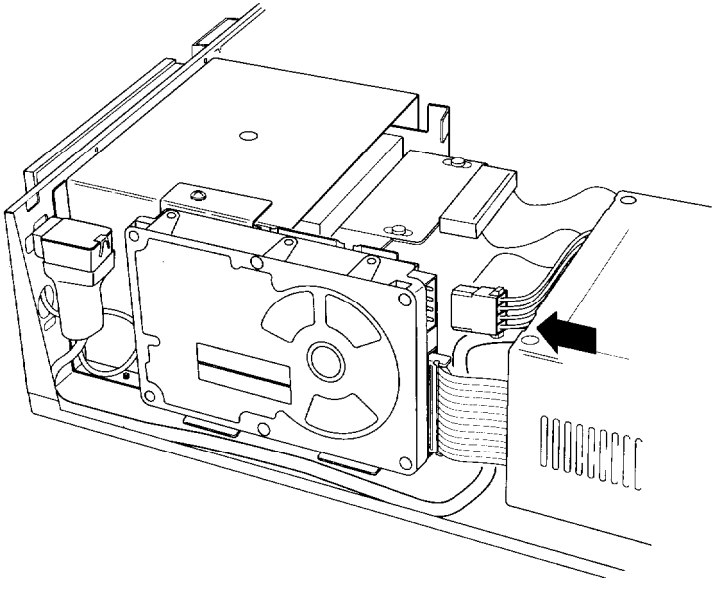


4. Make sure the holes in the cable connector fit over all the pins in the hard disk drive connector; then push in the connector.

> **Caution**
> If you do not correctly align the holes with the pins, you could severely damage your hard disk drive when you push in the cable connector.

5. Locate one of the power supply cables that lead from the power supply (behind the horizontal drive bays). The power supply cables may be secured in a plastic band on the side of the power supply. If so, unfasten the band to access the cables; you can use any one that is free. (If your drive requires a small power supply cable connector, use the small connector.)

6. Position the power supply cable connector so that its notched corners line up with the notched corners of the power supply connector on the hard disk drive. Make sure the holes fit over all the pins and then push in the connector firmly.

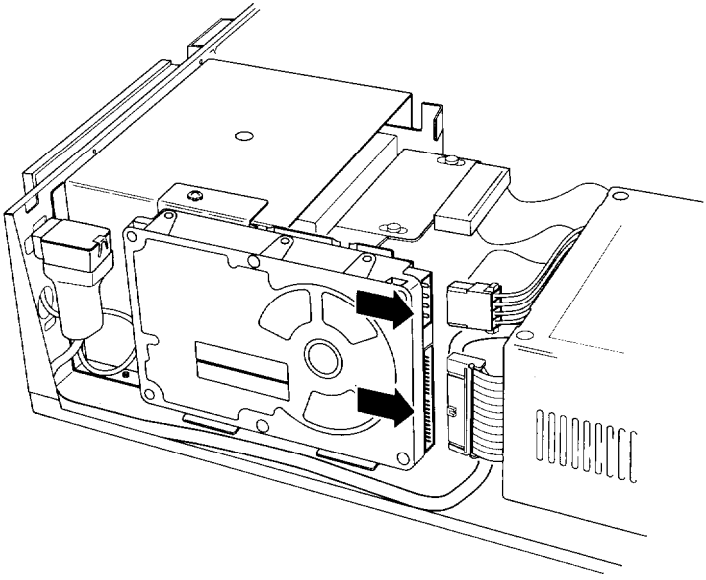


Caution
If you do not align the cable connector correctly, you could severely damage your hard disk drive when you push it in.

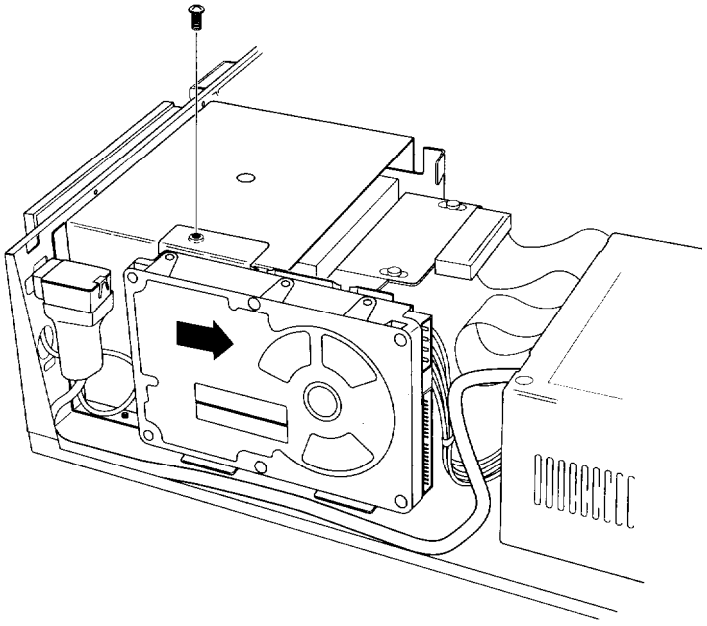
Removing a Hard *Disk From the Vertical Bay*

Follow these steps to remove a hard disk drive from the vertical drive bay:

1. Disconnect the hard disk drive ribbon cable and power supply cable from the back of the drive, as shown below. Grasp the cable connectors and pull them straight out from the connectors on the hard disk drive so you do not bend the pins; do not pull on the cables.



2. Remove the retaining screw securing the hard disk drive and mounting plate to the horizontal drive bays. Then slide the hard disk drive and mounting plate in the direction of the arrow, shown in the following illustration, and lift them out of the computer.



3. Remove the four screws securing the mounting plate to the hard disk drive. You can store the mounting plate and its screw or replace it in the computer and secure it with the screw.

4. Wrap the hard disk drive in its original packing materials and store it along with the four screws.

5. If you removed your computer's only hard disk drive, disconnect the hard disk drive ribbon cable from the main system board and store it as well.

If you removed one hard disk drive and are leaving another one in the computer, you need to set the jumpers on the remaining drive to indicate that you now have only one hard disk drive. For the correct settings, see the documentation that came with the drive.

Installing a Drive in a Horizontal Bay

This section describes how to install a drive in a horizontal bay. Although the illustrations show a diskette or hard disk drive in the lower bay, you can use these instructions to install a drive in the upper bay. You'll find steps for the following procedures:

- ❑ Attaching the mounting frames to a hard disk drive (if necessary)
- ❑ Installing the drive
- ❑ Connecting the cables.

If you are installing your computer's first hard disk drive, it is best to use the vertical drive bay as described on page 5-5.

> **Note**
> Before you install a hard disk drive, be sure to check the jumpers on the drive. For instructions, see page 5-4.

Depending on the type of drive you are installing, you may need to attach mounting frames to it before you install it in a horizontal bay. Follow these guidelines:

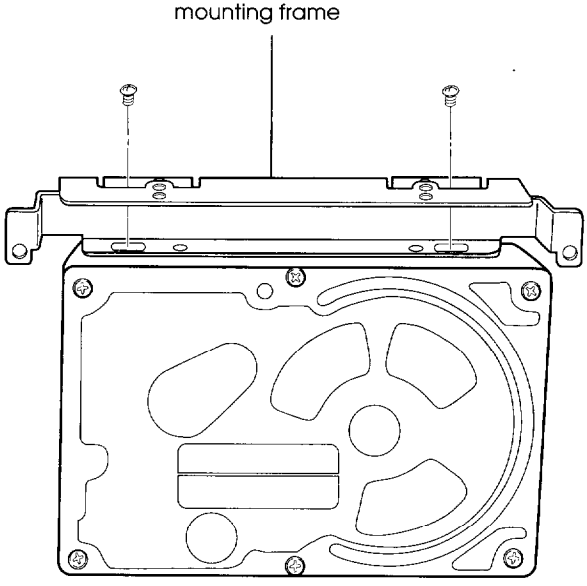
- ❑ If you are installing a diskette drive, skip to "Installing the Drive" on page 5-18.
- ❑ If you install a hard disk drive that has a 3.5-inch form factor, it must have mounting frames to fit properly in the horizontal bay. Follow the steps in the next section.
- ❑ If you are installing a hard disk drive that already has mounting frames on it, see if it also has a plastic guiderail and metal grounding plate attached to it. If so, follow step 1 on page 5-6 to remove the guiderail and grounding plate. Then go to "Installing the Drive" on page 5-18.

Attaching Mounting Frames to a Hard Disk

To attach mounting frames to a hard disk drive, follow these steps:

1. Locate the two mounting frames and four screws that came with the drive.

2. As shown below, place a mounting frame on top of one side of the drive and align it so that the holes in the drive are approximately in the middle of the oval holes in the frame. Then secure the mounting frame to the drive with the two screws.



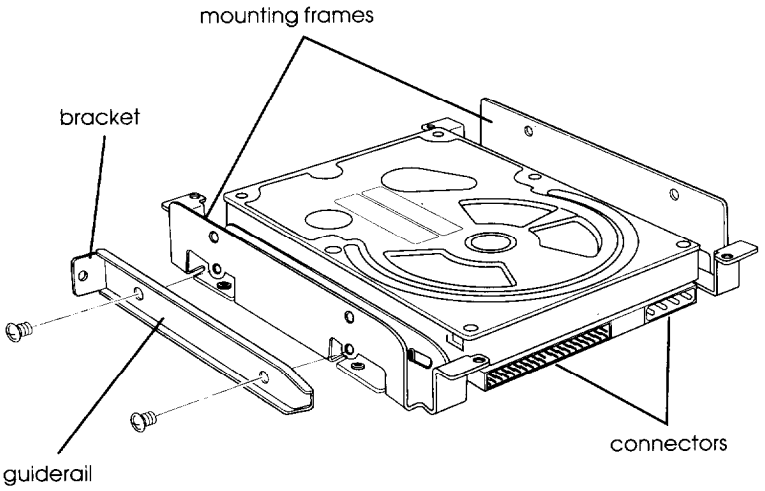
3. Repeat step 2 to attach a mounting frame to the other side of the drive.

Installing the Drive

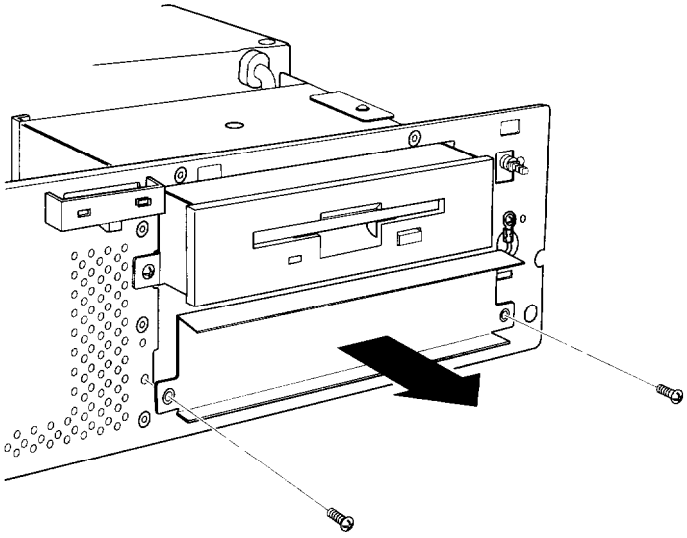
Follow these steps to install the drive in a horizontal drive bay:

1. Locate the two metal guiderails and six screws that came with the computer.

2. Using the appropriate screw holes, attach one guiderail to each side of the drive (or each mounting frame, if attached), as shown below. The bracket on the guiderail should be on the opposite side of the connector end of the drive.



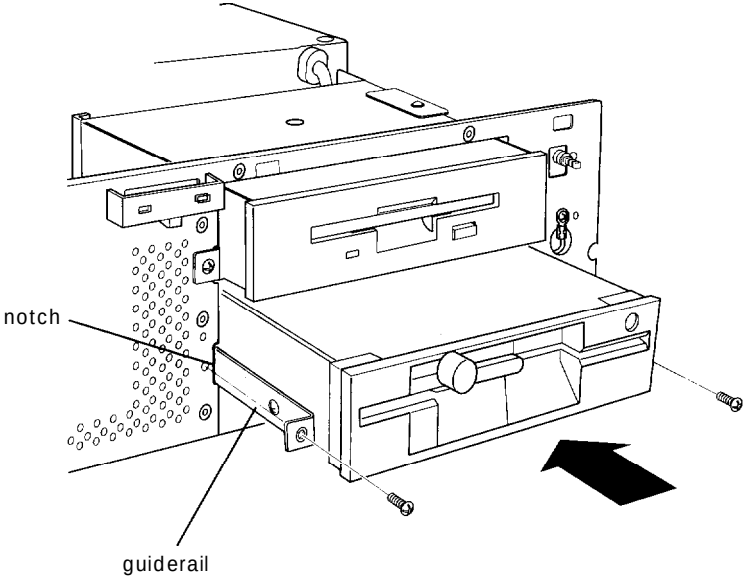
3. If you are installing a drive in the lower bay, remove the two retaining screws securing the metal drive bay cover to the front of the computer and remove the cover. Store it in a safe place and save the screws to use later in these steps.



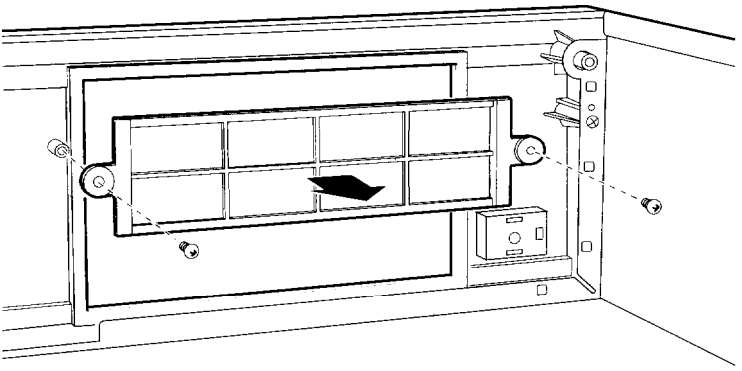
4. If you are installing a 5.25-inch diskette drive, hold it so that the diskette release latch is above the diskette slot. If you are installing a 3.5-inch diskette drive or a 5.25-inch dual drive, hold it so that the diskette release button(s) are on the right and the drive light is on the left.

   If you are installing a hard disk drive, hold it so that the component side faces down, and skip to step 7.

5. To insert a diskette drive, align the guiderails on each side of the drive with the notches on each side of the drive bay and slide the drive into the bay as far as it will go, as shown below. Secure the guiderails to the computer case with the two retaining screws.

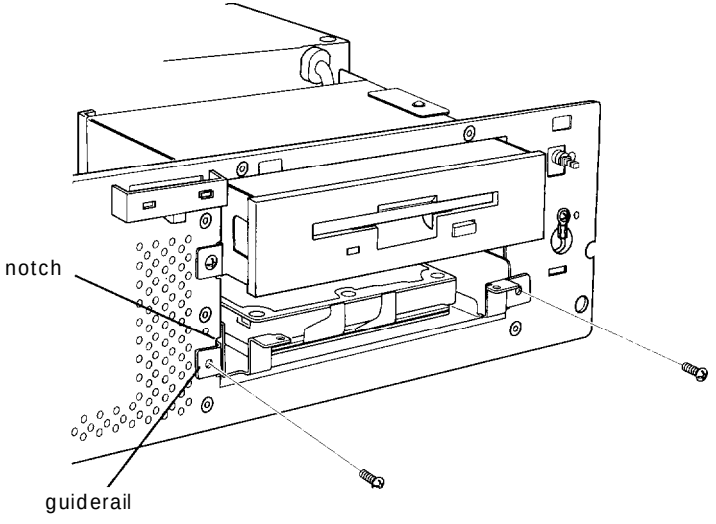


6. If you are installing a diskette drive in the lower bay, you need to remove the faceplate on the computer's front panel because it covers this bay. Turn the cover over and locate the faceplate. Remove the screws securing the faceplate to the inside of the computer's cover and remove the faceplate, as shown in the following illustration.



Store the faceplate and screws in a safe place; you may want to install it again later. Then go to "Connecting the Cables" on page 5-22.

7. To insert a hard disk drive, align the guiderails on each side of the drive with the notches on each side of the drive bay and slide the drive all the way into the bay, as shown below. Secure the guiderails to the computer case with the two retaining screws.



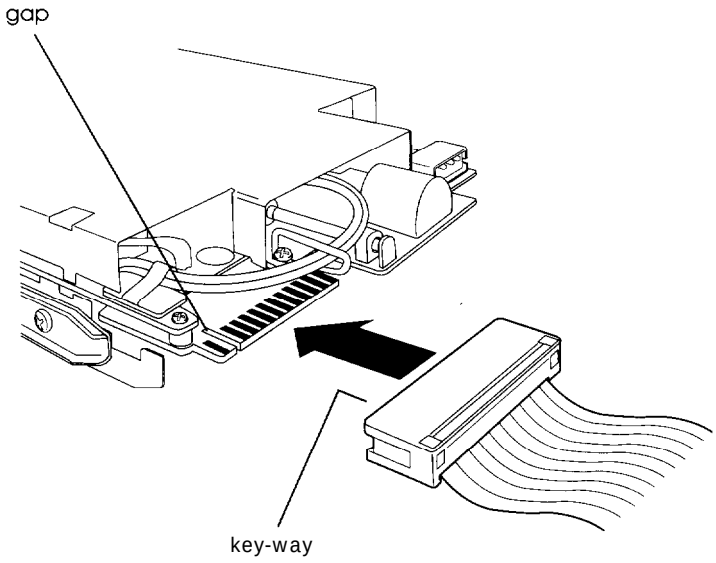
Connecting the Cables

To connect the drive to the computer, you need to connect two cables: a drive ribbon cable and a power supply cable. The steps below describe how to connect these cables to the drive.

If you are installing a diskette drive, follow step 1 and then skip to step 3. If you are installing a hard disk drive, start with step 2.

1. Locate the diskette drive ribbon cable. One end of the cable is connected to the system board. If you are installing a second diskette drive in the lower horizontal drive bay, the other end of the cable is connected to the top diskette drive; use the middle connector. If you are installing a diskette drive in the upper bay, use the free end connector.

   The diskette drive connector that extends from the back of the drive has gold contacts on both sides. Grasp the cable connector and align it with the drive connector so that the key-way (the plastic divider) in the cable connector lines up with the gap in the drive connector, as shown below.

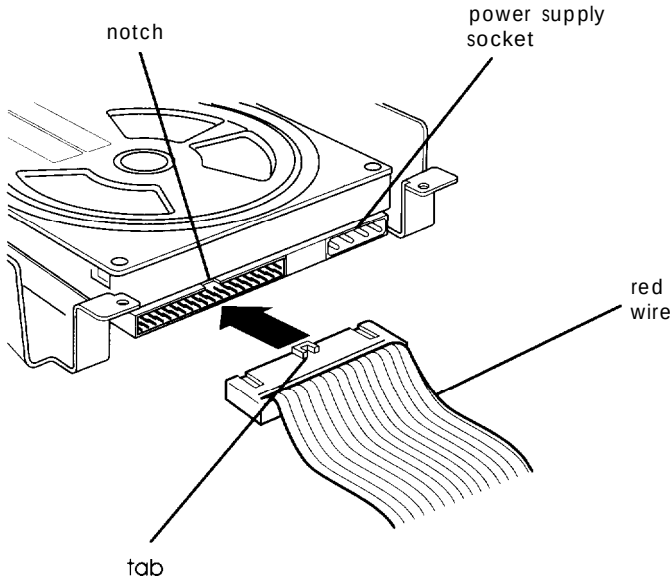


Make sure the cable connector fits properly onto the drive connector and push it into place. Be careful to align the connector correctly; otherwise, you could severely damage your drive when you push it in. Go to step 3.

2. Locate the hard disk drive ribbon cable. If you are installing a second hard disk drive, one end of the cable is connected to the system board and the other end is connected to the first hard disk drive in the vertical drive bay; use the free middle cable connector to connect the second hard disk drive as described below.

   If you are installing your computer's first hard disk drive, you need to connect the hard disk drive ribbon cable to the system board now. Follow the instructions on page 5-30 and then use the middle cable connector to connect the hard disk drive as described below.

   Notice the small tab in the middle of the cable connector; align this tab with the notch in the hard disk drive connector, as shown below.



When the hard disk drive ribbon cable is positioned correctly, the red wire on the cable is aligned with pin 1 on the drive connector. To identify pin 1, look for a 1 or 2 at the connector on the drive's circuit board.

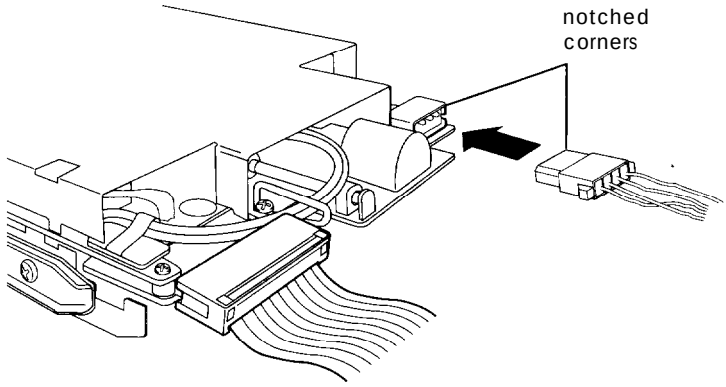
Make sure the holes in the cable connector fit over all the pins in the hard disk drive connector; then push in the cable connector.

> **Caution**
> If you do not correctly align the holes with the pins, you could severely damage your hard disk drive when you push in the cable connector.

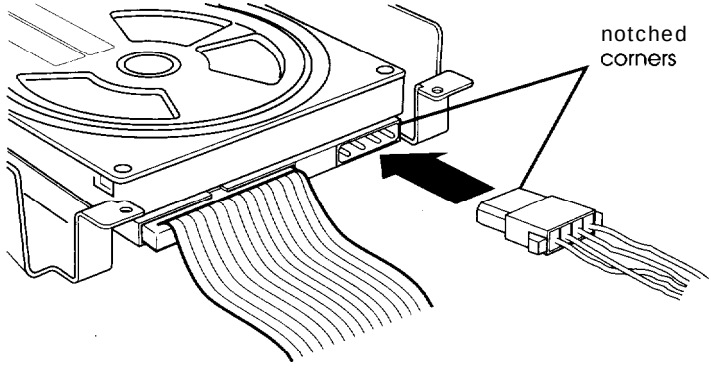
3. Locate one of the power supply cables that lead from the power supply (behind the horizontal drive bays). The power supply cables may be secured in a plastic band on the side of the power supply. If so, unfasten the band to access the cables; you can use any one that is free. (If your drive requires a small power supply connector, use the smaller one.)

4. Position the power supply cable connector so that its notched corners line up with the notched corners of the drive's power supply connector, as shown below. Make sure the holes fit over all the pins and then push in the connector.

diskette drive



hard disk drive



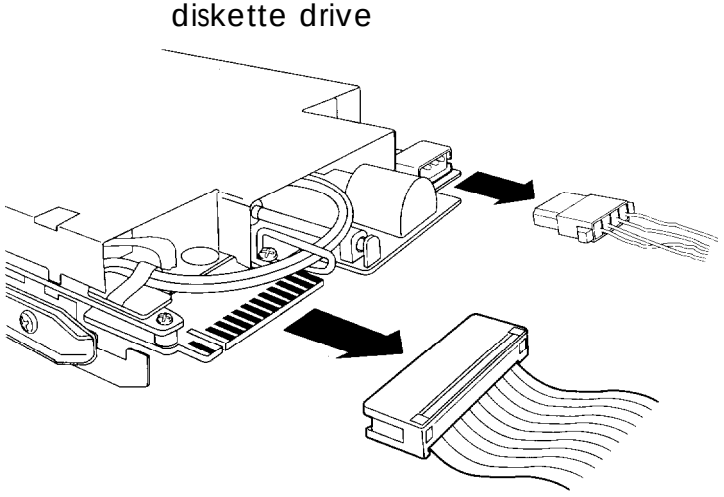
Caution
If you do not align the cable connector correctly, you could severly damage your drive when you push it in.

Removing a Drive From a Horizontal Bay

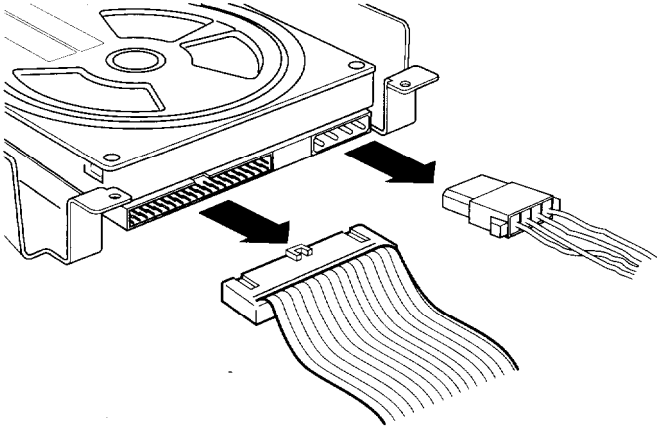
This section describes how to remove a drive from a horizontal drive bay. Although the illustrations show a diskette or hard disk drive in the lower bay, you can use these same instructions to remove a diskette drive from the upper bay.

Follow these steps to remove a drive from a horizontal bay:

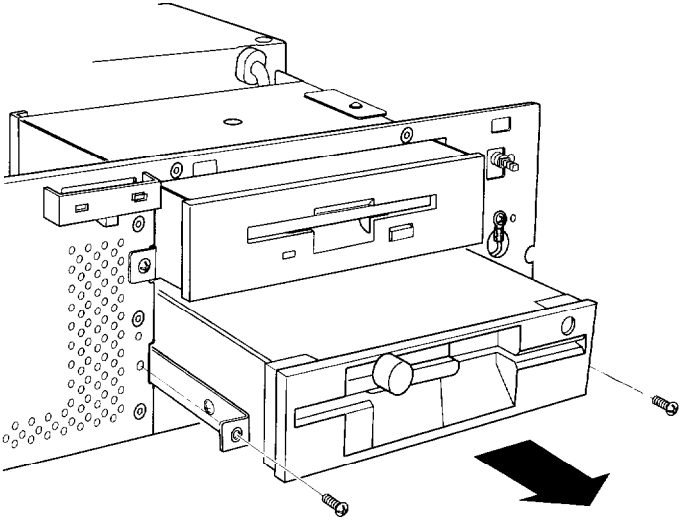
1. Disconnect the drive ribbon cable and power supply cable from the back of the drive, as shown below. Grasp the cable connectors and pull them straight out from the connectors on the drive so you do not bend the pins; do not pull on the cables.



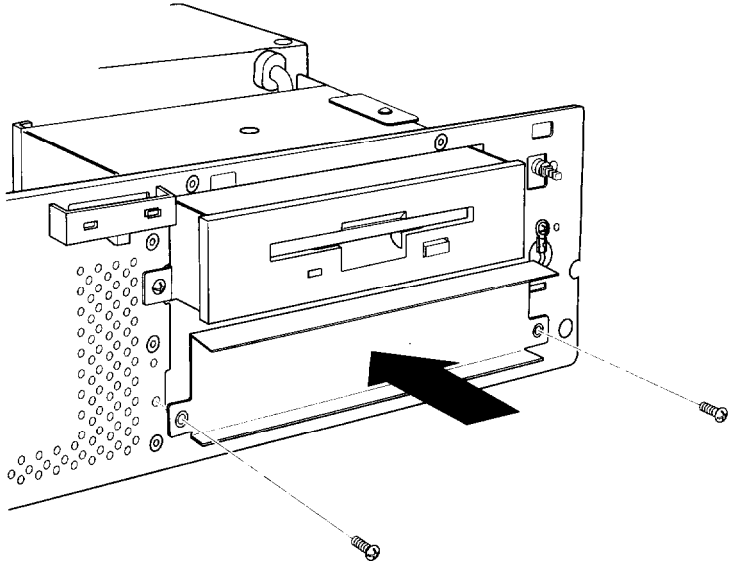
hard disk drive



2. Remove the two retaining screws securing the drive to the drive bay. Then grasp the front of the drive and pull it completely out of the bay.



3. If you are leaving the drive bay empty, replace the metal drive bay cover and two retaining screws, as shown below.



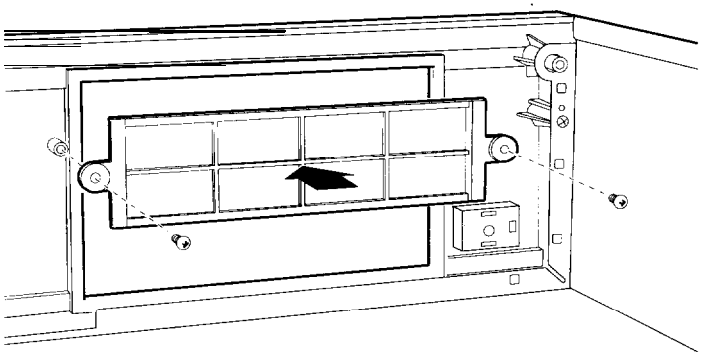
4. If you are replacing the drive you removed with another drive, remove the guiderails and screws from the drive and use them to install the other drive as described in "Installing a Drive in a Horizontal Bay" on page 5-16.

5. Wrap the drive in its original packing materials and store it in a safe place.

6. If you removed your computer's only hard disk drive, disconnect the hard disk drive ribbon cable from the system board and store it as well.

If you removed one hard disk drive and are leaving another one in the computer, you need to set the jumpers on the remaining drive to indicate that you now have only one hard disk drive. See the documentation that came with the drive for the correct jumper settings.

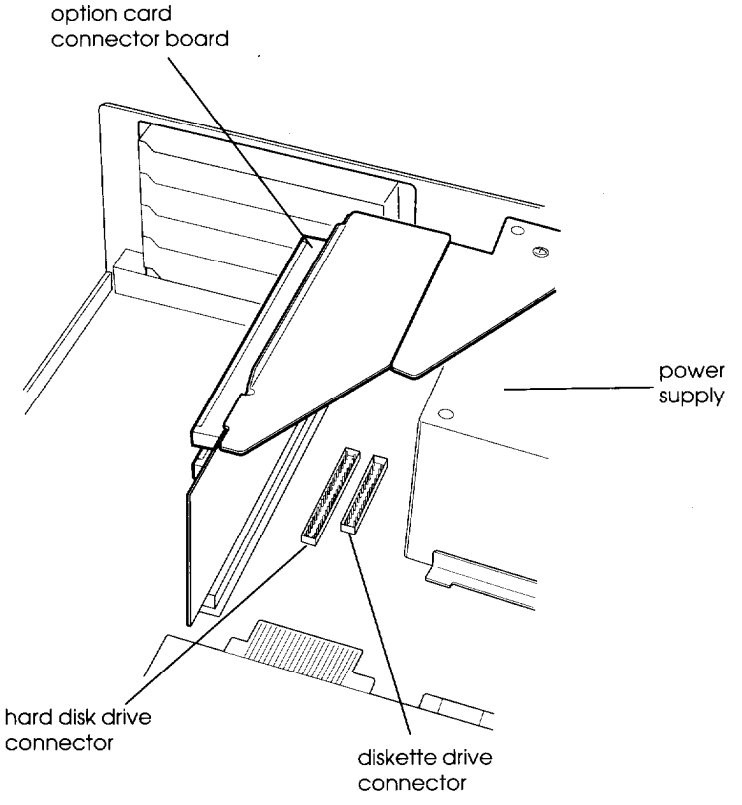
7. If you removed a diskette drive from the lower bay and you are leaving the bay empty or installing a hard disk drive in it, you need to replace the front panel faceplate on the computer's cover. Secure the faceplate to the inside of the computer's cover with the two screws, as shown below.



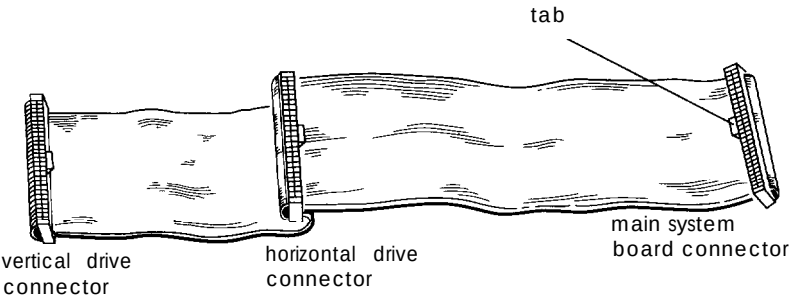
Connecting the Hard Disk Drive Ribbon Cable to the System Board

Follow these steps to connect the hard disk drive ribbon cable to the system board:

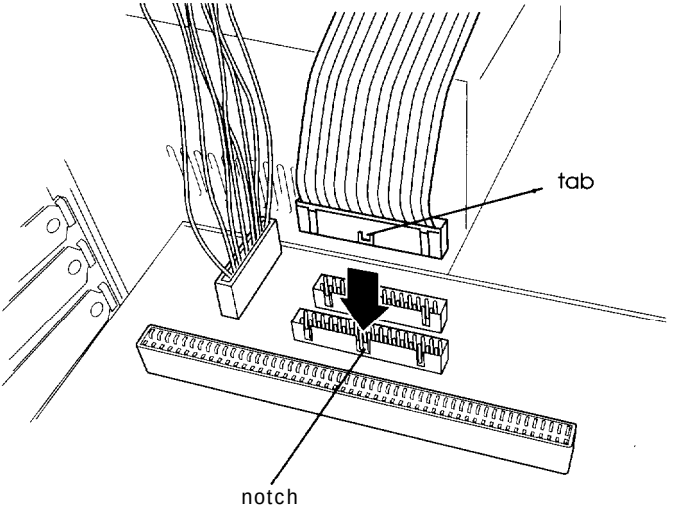
1. Locate the hard disk drive connector on the system board. As shown below, it is next to the diskette drive connector, between the option card connector board and the power supply. (The diskette drive ribbon cable is removed from the illustration for clarity.)



2. Locate the hard disk drive ribbon cable that came with the computer. It is a flat cable with three connectors: one on each end and one in the middle, as shown below.



3. Select the connector on the end of the longest part of the cable (the main system board connector). Notice the small tab in the middle of the cable connector, as shown in the illustration above. Align the connector so that the tab aligns with the notch, as shown below. (The option card connector board and diskette drive ribbon cable are removed from the illustration for clarity.)



Note
You may find it easier to plug in the cable connector if you first remove the option card connector board and diskette drive ribbon cable. To remove the option card connector board, see page 4-20. To disconnect the diskette drive ribbon cable, grasp the cable connector and pull it straight out from the system board connector so you do not bend the pins; do not pull on the cable.

4. Make sure the holes in the cable connector fit over all the pins in the system board connector; then push in the cable connector.

Caution
If you do not correctly align the holes with the pins, you could severely damage your system board when you push in the cable connector.

5. If you removed the option card connector board and diskette drive ribbon cable, replace them now. To connect the diskette drive ribbon cable, align the tab on the cable connector with the notch in the system board connector. Make sure the holes in the cable connector fit over all the pins in the system board connector and push in the cable connector. Then replace the option card connector board as described on page 4-21.

Post-installation Procedures

After you install or remove your drive(s) and replace the computer's cover, follow the steps below to make sure your new configuration works properly:

1. Run the SETUP program to configure your computer for your new set of drives. See Chapter 2 for instructions.

2. If you installed a non-IDE hard disk drive (which requires a separate controller card to control it), you need to run the SETUP program to disable the built-in IDE hard disk drive interface.

3. You may need to format the drive before you can use it. (All Epson drives are sold already formatted.) Check the manual that came with the drive to see if it is already formatted. If not, follow the manufacturer's instructions to format the drive.

4. If you want to be able to load your operating system from a new hard disk drive, you need to install it on the drive. See the documentation that came with your operating system for instructions.

Chapter 6

Troubleshooting

Refer to this chapter if you encounter any difficulties as you set up and use your computer. If the suggestions here do not solve the problem, perform the steps below to identify your system and note any error messages your computer displays. Then contact the Epson Connection at (800) 922-8911 for assistance.

Identifying Your System

When you request technical assistance, be ready to provide the serial number of your computer, its system BIOS version number, its configuration (including the type of disk drives, monitor, and option cards), and the names and version numbers of any software programs you are using.

You can find the computer's serial number on its back panel. If you are able to use your computer, follow the steps below to obtain information about your configuration, as well as the version numbers of your system BIOS and MS-DOS (or other operating system).

1. Turn on your computer or press Ctrl Alt Delete to reset it.

2. As the computer performs its power-on diagnostics, the version number of your video BIOS appears at the top of the screen. Next, the system BIOS version number appears in a window at the bottom of the screen. Quickly write down these version numbers. If you do not have enough time to do this, press Ctrl Alt Delete and try again.

3. When you see **Press <Del> if you want to run SETUP,** do not press Delete. You see the System Configuration screen. (This screen lists your current configuration.) Copy any necessary configuration information shown so you can refer to it when you call for assistance.

4. If you are using MS-DOS, at the command prompt type **VER** and press Enter. The screen displays the MS-DOS version number. Write it down. (If you are using another operating system, see the manual that came with it for instructions on obtaining the version number.)

Error Messages

Your computer's built-in memory (ROM) contains a series of diagnostics programs, called power-on diagnostics, which your computer runs automatically every time you turn it on. These programs check internal devices such as ROM, RAM, the timer, the keyboard controller, and the hard disk drive.

When the system detects an error that isn't serious, such as an incorrectly defined diskette drive, you see an error message and the following prompt:

Press **<Fl> to run SETUP or <F2>** to continue

Write down the error message and press F2 to continue.

If the system detects a serious error, the computer cancels further checking and halts system initialization. The error message remains on the screen and the computer locks up. If this happens, see "The Computer Won't Start" in this chapter. If none of the suggestions listed there solves the problem, contact the Epson Connection as soon as possible. Report any error messages when you request technical assistance.

The following table lists error messages that may appear during power-on diagnostics. If you receive an error message, look it up in the table below; it directs you to the proper troubleshooting section in this chapter or offers a solution. If you do **not** see an error message, read the section that covers your problem.

Power-on *diagnostics error messages*

Error message	Action
CMOS BATTERY HAS FAILED	The CMOS battery is bad. Contact the Epson Connection.
CMOS CHECKSUM ERROR - DEFAULTS LOADED	Your CMOS RAM has possibly been corrupted. Run the SETUP program and check your settings (see Chapter 2). If your settings are correct, save them as you exit the SETUP program. If you see the message again, or if your settings returned to the factory defaults, contact the Epson Connection.
DISK BOOT FAILURE, INSERT SYSTEM DISK AND PRESS ENTER	The system found no boot device. First run the SETUP program and check the boot sequence settings. If the settings are correct and you are booting from a hard disk drive, see "Hard Disk Problems." If you are booting from a diskette, make sure the diskette is bootable; then see "Diskette Problems."
DISPLAY SWITCH IS SET INCORRECTLY	DIP switch 5 conflicts with the video options in the SETUP program. See Chapter 4 for correct DIP switch settings and Chapter 2 for instructions on running SETUP.
DISPLAY TYPE HAS CHANGED SINCE LAST BOOT	The display adapter has been changed. Run SETUP. See Chapter 2.

Power-on diagnostics error messages (continued)

Error message	Action
FLOPPY DISK CONTROLLER ERROR OR NO CONTROLLER PRESENT	The system was unable to detect a diskette drive controller. If you have no diskette drive, run SETUP and select **none** for both diskette drives. If you have at least one diskette drive. see "Diskette Drive Problems."
FLOPPY DISK TYPE IS SET INCORRECTLY OR DRIVE ERROR	The installed diskette drive does not match the CMOS definition. See "Diskette Drive Problems."
HARD DRIVE CONTROLLER DIAGNOSTICS ERROR	The system was unable to detect the hard disk drive controller. See "Hard Disk Problems."
HARD DRIVE SECTOR VERIFY ERROR	Your hard disk drive may be damaged. Contact the Epson Connection.
KEYBOARD ERROR OR NO KEYBOARD PRESENT	Your keyboard may not be connected correctly. See "Keyboard Problems."
MEMORY ERROR DURING MEMORY TEST	Your SIMMs may not be installed correctly. See 'Memory Module Problems."
NON-SYSTEM DISK OR DISK ERROR	The system cannot boot from the diskette. Make sure the diskette is bootable and see "Diskette Problems."
PASSWORD CHECK FAILED - SYSTEM HALTED	You've entered an incorrect password. See "Password Problems."
UNABLE TO INITIALIZE HARD DRIVE (DRIVE TYPE?)	Your hard disk drive cannot be initialized. See "Hard Disk Problems."

Power-on diagnostics error messages (continued)

Error message	Action
UNABLE TO RECALIBRATE HARD DRIVE	Your drive is probably damaged. Contact the Epson Connection.
UNABLE TO RESET HARD DRIVE/ CONTROLLER ERROR	Your system cannot find or initialize your hard disk drive controller. See "Hard Disk Problems."

The Computer Won't Start

If your computer does not start when you turn on the power, check the following:

1. Is the power light on? If not, remove any diskettes and turn off the power. Make sure the power cord is securely connected to both the AC inlet on the back panel and an electrical outlet. Replace your main operating system diskette, if necessary, and turn on the computer again.

> **Caution**
> If you turn off the computer, always wait at least 20 seconds before turning it back on. This prevents damage to the computer's electrical circuitry.

2. If the power light still does not come on, check the electrical outlet for power. Turn off your computer, unplug the power cord, and plug a lamp into the outlet. Turn it on to see if the outlet supplies power.

3. If you installed or removed any of your system components, such as a disk drive, check to make sure you have reconnected all the internal and external cables correctly. See Chapters 4 and 5 for instructions.

You may have installed option cards that exceed the system's power requirements. Check the power requirements in Appendix A.

4. If the electrical outlet is working and all the connections are secure but your computer still won't start, call the Epson Connection for assistance.

The Computer Does Not Respond

If your computer locks up and does not respond when you type on the keyboard, follow these steps:

1. Wait a few moments; some operations take longer than others to complete. For example, the computer takes longer to sort a database than to display the time. If your computer still does not respond after a reasonable length of time, proceed to the next step.

2. If you have just made a change in your system configuration, your computer may take a few minutes to complete its power-on diagnostics. The first time you turn on your computer after making such a change, it can take several minutes to finish its self test, depending on what you changed. If the computer does not display the operating system prompt after five minutes, turn it off, wait 20 seconds, and try again. If that doesn't work, turn off the computer, insert your main operating system diskette in drive A and turn on the computer. If it still does not boot, contact the Epson Connection for assistance.

3. Did you enter the correct password? See "Password Problems" below.

4. Could your software be causing the problem? If you are running an application program, see "Software Problems" later in this chapter.

5. The problem could be caused by your keyboard. See "Keyboard Problems" later in this chapter.

6. If you want to stop whatever the computer is doing and return to the MS-DOS command prompt, hold down the Ctrl key and press Break (or C). See Chapter 3 for more information on stopping a command or program.

7. If your computer still does not respond, you can reset it using the Ctrl Alt Delete command. See "Resetting Your Computer" in Chapter 3 for more information.

8. If resetting the computer does not work, turn it off and wait at least 20 seconds. If you do not have a hard disk drive, insert your main operating system diskette in drive A; then turn on the computer. It should load the operating system.

9. If you installed a display adapter card (and did not connect it to the feature connector on the main system board), you must set jumper J3 to disable the built-in VGA adapter. Otherwise, you will not see any display on the screen. See "Changing the Jumper and DIP Switch Settings" in Chapter 4.

Restoring the Power Supply

To restore normal power supply operation, follow these steps:

1. Turn off the computer and leave it off for at least 30 seconds to reset the power supply logic.

2. To determine the cause of the high temperature and correct the condition, check for the following:

   - ❑ Room temperature above 90 ° F (32°C). If this is the case, relocate the computer to a cooler area.

- ❑ A blocked power supply fan. Make sure there is space around the power supply fan vents in the back and sides of the computer case. Remove the computer's cover and check both inside and outside the computer for blockage. Make sure there is ample room around your system for air circulation.

- ❑ An overload of the power supply limitations. Check the table in Appendix A to see if you have exceeded the option slot power limits. See your option card manual(s) for the power requirements for your option card(s).

3. After you correct the problem causing the overheating, allow the computer to cool down for at least five minutes at room temperature (about 78° F or 25° C).

4. If you removed the computer's cover, replace it now. (See Chapter 4 for instructions.) Then turn on the computer.

If the power supply shuts off again, contact the Epson Connection for assistance.

Password Problems

If you have any trouble using your password, try the following:

1. If you think you know the correct password, reset the computer and try again. See Chapter 3 for instructions.

2. If you know the current password but you want to change or delete it, see Chapter 2 for instructions.

3. If you do not know the current password and you cannot access your computer or use the SETUP program, see the next section.

Accessing Your System

If you have forgotten your current password, follow these steps:

1. Turn off the computer.

2. Disable the password function by setting DIP switch 4 to Off. (See Chapter 4 for instructions.)

3. Turn on the computer.

4. Turn the computer off again.

5. Follow the instructions under "Changing the DIP Switch Settings" in Chapter 4 to set DIP switch 4 to the On position.

6. Turn on the computer again.

7. When you see **Press <Del> if you want to run SETUP,** press Delete. . You see the SETUP main menu. Press ↓ to highlight option 3, **Set Password options;** then press Enter. If you do not want to set a new password, go to step 9. If you want to set a new password, go to step 8.

8. To set a new password, set the **Password** State option to **Installed** and press Enter. Type a new password at the prompt and press Enter. You must enter it twice. (See Chapter 2 for more information.) Now go to step 10.

9. To disable the password, press Pg Up or Pg Dn until the **Password State** option is set to **Not Installed;** then press Enter. (See Chapter 2 for more information.)

10. Save your settings as you exit SETUP. The computer reboots. If you disabled password security, you do not see the password prompt and can access your computer immediately. If you set a new password, you see the password prompt.

Keyboard *Problems*

If you have trouble with the keyboard, check the following:

1. If the screen displays a keyboard error message when you turn on or reset the computer, make sure the keyboard is securely connected to the correct port. See "Connecting the Keyboard" in Chapter 1 for instructions.

2. If nothing happens when you type on the keyboard, see "The Computer Does Not Respond," above.

3. If the cursor keys on the numeric keypad do not work properly, the num lock function may be on. When num lock is on, the keys on the numeric keypad work only as numbers. If the Num Lock light in the upper right corner of the keyboard is lit, press Num Lock to turn off the function.

   If you want to change the initial num lock setting, see "Setting the NumLock Boot Status" in Chapter 2.

4. If you still have trouble with the keyboard, contact the Epson Connection for assistance.

Monitor Problems

For monitor problems, check the following:

1. If there is no display on the screen, check that the monitor's power switch is on and that its power light is lit. If the power light is on but you still do not see anything on the screen, check the brightness and contrast controls.

2. If the power switch is on but the power light is not, turn off the monitor's power, wait five seconds, and turn it back on. Wait to see if the screen displays any text.

3. If the screen is still blank, make sure the monitor is connected to the computer securely. See "Connecting a Monitor" in Chapter 1 for instructions.

4. If the monitor's power light still does not come on, check the electrical outlet for power. Turn off your monitor and unplug it from the outlet. Then plug a lamp into the wall outlet and turn it on to see if the outlet supplies power.

5. If you installed a display adapter card, make sure your monitor and display adapter match. Also check to see if the card's switches or jumpers are set properly. See "Installing an Option Card" in Chapter 4 and your monitor and display adapter card manuals for instructions.

6. If you are running an application program, see if you need to set up the program for the type of monitor and display adapter you have. Also make sure you are using the appropriate monitor and display adapter for your software.

> **Note**
> If your application program requires a monitor that supports graphics but you have a monochrome monitor, the results will be unpredictable.

7. If you installed a display adapter card (and did not connect it to the computer's feature connector), you must set jumper J3 to disable the built-in VGA adapter or you will not see anything on the screen. See "Changing the Jumper and DIP Switch Settings" in Chapter 4 for instructions.

8. If you still have difficulty with your monitor, contact the representative who sold you the monitor.

Diskette Problems

If you see an error message or have trouble accessing data on a diskette, try the following steps:

1. You may have inserted the diskette upside-down or it may not be inserted all the way. Remove the diskette and reinsert it. If the diskette drive has a latch, be sure to turn it down to secure the diskette. See Chapter 3 for detailed instructions on inserting and removing diskettes.

2. If reinserting the diskette does not solve the problem and you have access to another drive of the same type, place the diskette in the other drive and repeat the operation. If you can read the diskette, the trouble may be in your diskette drive. See "Diskette Drive Problems" below.

3. Have you inserted the right type of diskette? For example, are you trying to read a 1.44MB diskette in a 720KB diskette drive?

4. Is the diskette write-protected? On a 3.5-inch diskette, the write-protect switch may be set to the write-protect position or there may be no switch. On a 5.25-inch diskette, there may be a write-protect tab over the side notch or there may be no notch. You cannot alter data on a write-protected diskette. (Some programs do not function properly if the diskette is write-protected.) See Chapter 3 for more information.

5. Is the diskette formatted? A new diskette must be formatted before you can store data on it. See your operating system documentation for instructions on formatting diskettes.

6. Did you receive one of the following MS-DOS error messages?

   Disk Drive Error: Abort, Ignore, **Retry?**

   Disk error reading drive *d:*

   Disk error writing drive *d:*

   If you see one of these messages, **make** sure the diskette is properly inserted in the drive. If the problem persists, try removing the diskette and reinserting it. If the error message still occurs, you may have a defective diskette. Try copying the files from the bad diskette to a new diskette.

7. If you see no error messages but there is something wrong with the data in a file, the operating system or an application program may have updated the storage information on the diskette incorrectly. This is probably the case if you have one of these problems:

   - Part of a file is missing
   - A file includes parts of other files
   - An expected output file is missing.

   If you are using MS-DOS use CHKDSK to make the necessary repairs; see your MS-DOS documentation for instructions. You may also have some special diagnostic software you can use to check your diskettes.

Diskette Drive Problems

If you see a diskette error message or have difficulty with a diskette drive, follow these steps:

1. If you have problems with a new diskette drive that someone else installed, consult that person about the problem.

2. If you installed the drive yourself, did you carefully follow all the steps in Chapter 5? Review the instructions and check all the cable connections to make sure you installed the drive correctly.

3. Did you run the SETUP program and configure the correct type of diskette drive for your system? (See Chapter 2 for instructions.)

4. If the diskette drive is making loud or unusual noises, do not attempt any further examination of it. Contact the Epson Connection for assistance.

Hard Disk Problems

If you have a problem with a hard disk, it could be the result of improper installation, incomplete disk preparation, or corrupted data. Consult one of the following sections:

- Installing the drive
- Preparing the drive for use
- Accessing data on the drive.

> **Caution**
> If your hard disk has data on it, always be sure to back up your data before reformatting or repartitioning the drive.

Installing the Drive

If you have problems with a newly-installed drive, check the following:

1. If someone else installed the drive, consult that person about the problem.

2. If you installed the hard disk in your computer, did you carefully follow all the instructions in Chapter 5? Review the instructions, check all the cable connections, and check the jumper settings on your drive.

3. If you installed an IDE hard disk drive, be sure you run SETUP to update your configuration. Check to make sure you selected the correct drive type and that you enabled the built-in IDE hard disk drive controller with the **`Peripherals SETUP`** option in SETUP. (If you connected the IDE drive to a controller on an option card, be sure you set the built-in controller to **`Disabled.)`** See Chapter 2 for instructions.

4. If you installed a non-IDE hard disk drive, was it physically formatted by the manufacturer? A blank, new hard disk must be physically formatted (or *initialized)* before you can partition it and install an operating system on it. This type of format is usually done by the manufacturer; if yours was not, you must do it yourself. If the drive came with its own format utility, use that program.

   Note that a physical format is different from the software-based type of formatting commands (such as the MS-DOS SELECT or FORMAT commands). See "Preparing the Drive," below, for more information.

Preparing the Drive

Before you can store data on a new hard disk (which has already been physically formatted), you must do the following to prepare it for use:

1. Run the SETUP program to define your hard disk as part of the computer's configuration. (See Chapter 2 for instructions.)

2. Partition and format the drive for your operating system. If you are using MS-DOS, instructions for performing these procedures are provided in your MS-DOS manuals. If you are using another operating system, follow the instructions that came with it.

If you do not prepare the drive correctly, you cannot store data on the disk. For example, if you partition the drive and format it for MS-DOS (or for another operating system) but you do not copy the operating system to the drive, you will not be able to load the operating system from the hard disk.

If you are sure the hard disk was installed properly and you prepared it for use as described above but you cannot access the drive, review the instructions in your operating system manuals. Make sure you performed each step in the installation process correctly for your configuration.

Accessing Data on the *Drive*

If you have been using your hard disk drive successfully for some time and notice a reduction in performance, the data on the disk may have become fragmented. You may want to back up all your data and then use a disk compaction utility to reorganize the files on your disk. Many general utility programs include a disk compaction utility.

If you still have trouble with your hard disk, you can back up your data and physically reformat the disk. Then you'll need to reinstall the operating system and copy your files back onto the disk. See your operating system manual for instructions.

If you cannot access data on your hard disk or you are receiving read/write errors, the disk may have a physical problem. Contact the Epson Connection for assistance.

Software Problems

If you have trouble with an application program, try the following:

1. If the application program does not start, check **that you** are following the correct procedure for starting the program, and **that** it is installed correctly. If you have a hard disk and the program is stored in a directory on that drive, make sure you are logged onto or specifying the correct directory. If you don't have a hard disk, make sure you inserted the correct diskette in drive A.

2. Your computer can run at fast or slow speed. While almost all programs work properly at the faster speed, some must run at the slower speed. Check your software manual to see if this is **the** case, and change the processor speed if necessary. See "Changing the Processor Speed" in Chapter 3 for instructions and information on using copy-protected programs.

3. If you entered an MS-DOS command that you want to stop, there are special key combinations you can use to cancel the command. These methods may also work in your application programs:

   - ❑ Press [Pause]
   - ❑ Hold down [Ctrl] and press [C]
   - ❑ Hold down [Ctrl] and press [Break].

4. An application program can occasionally lock the computer, making it unresponsive to keyboard commands. If your computer does not respond when you type on the keyboard, you can reset it. Follow the instructions in Chapter 3.

5. If resetting the computer does not help, remove any diskettes, turn off your system, wait 20 seconds, and turn it back on. Then restart your application program.

If none of these solutions solve your software problem, **contact** the software manufacturer for technical support.

Printer Problems

Below are some general steps to follow if you have difficulty with your printer. If the problem persists and you need more detailed information, check your printer manual.

You see a port error message if you are having trouble with the port to which your printer is connected.

1. If your printer does not work at all, check that the printer has power and is properly connected to the computer. (Also, make sure your printer has paper in it.) See Chapter 1 or your printer manual for instructions.

2. Check the printer manual for the printer's correct DIP switch or control panel settings. These settings help a printer communicate properly with the computer.

3. If you are using more than one serial or parallel port, the computer must know which port is the primary port and which is the secondary port. See Chapter 2 for instructions on how to set the parallel and serial ports using the **Peripherals** Setup option in SETUP program.

4. If your printer is properly set up but is still not functioning, test it from the MS-DOS level. When the screen displays the MS-DOS command prompt (such as C : \ or **A:** \), hold down Shift and press Print Screen. This should print the contents of the screen on your printer.

   If it does not, you may need to change the internal setting of the computer's parallel port for a parallel printer (or serial port for a serial printer). To do this, use the MS-DOS MODE or SETMODE command. See your printer manual and MS-DOS documentation for more details.

> **Note**
> If you are within Windows, pressing Shift Print Screen copies the screen contents to the clipboard rather than the printer.

5. Many application programs (such as word processors) must be set up properly before they can use a printer. Check your program manual to see what customizing may be required.

6. If you are using an application program that requires a printer driver, make sure the correct driver is installed. See your application program manual for instructions. Also see your printer manual for additional instructions on using your printer with application programs.

Option Card Problems

If you install an option card and it does not function properly, check the following:

1. Is the option card installed correctly? Make sure it is well-seated in its slot. Check the installation procedure described in Chapter 4 and also see the instructions that came with the card.

2. Did you set the necessary DIP switches or jumpers on the option card? See the card's manual for instructions.

3. Did you set the necessary jumpers on the main system board? See Chapter 4 for more information.

4. Did you run the SETUP program to update your computer's configuration after installing the card? See Chapter 2.

5. If you used the option card to add an external device to your computer, did you use the proper cable to connect the device to the card?

6. Did you perform the correct setup procedures for the software you are using with the option card? See your option card or software manual for instructions.

Mouse Problems

If you have trouble with your mouse or you see an auxiliary device error message, check the following:

1. Make sure the mouse cable is securely connected to the mouse port and not the keyboard port. If you have a serial mouse, make sure it is securely connected to the correct serial port. See Chapter 1 for instructions.

2. Did you install the mouse driver correctly? See your software manual and the documentation that came with your mouse for instructions. (Windows installs a mouse driver automatically.)

3. If you are using a serial mouse, did you disable the built-in mouse port with SETUP and enable the correct serial port? See Chapter 2 for instructions.

Memory Module Problems

If you added extra memory to your system by installing SIMMs and that memory is not operating properly, check the following:

1. If the memory count displayed by the power-on diagnostics program is incorrect, you may not have installed the SIMMs correctly. They may be the wrong type of SIMM or they may not be inserted all the way.

   See "Memory Modules (SIMMs)" in Chapter 4 and make sure you followed all the instructions.

2. Be sure to run the SETUP program after you install or remove memory modules to automatically update your memory configuration. See Chapter 2 for instructions.

3. If you still have trouble with your SIMMs, write down any error messages that appear and contact the Epson Connection for assistance.

External Cache *Problems*

If you added extra cache memory to your system by having cache DIP chips installed, and that memory is not operating properly, check the following:

1. If the cache memory amount displayed by the power-on diagnostics program is incorrect, your Authorized Epson Servicer may not have installed the cache correctly. Call your servicer to describe the problem.

2. Did the servicer set jumpers J5 through J9 to indicate the new amount of cache? Check the jumpers to see if they are set correctly. See "Changing the Jumper and DIP Switch Settings" in Chapter 4 for instructions.

3. If you still have trouble with your external cache, write down any error messages that appear and contact the Epson Connection for assistance.

Battery Problems

The battery in your computer is a 3.6 volt, lithium battery. It should last from three to five years before you need to replace it. When the batterys life has expired, you may see one of the following error messages:

```
CMOS battery state low
CMOS system option
```

Purchase a new battery (available from Epson Accessories) and follow the instructions in Chapter 4 to install it, or ask your Authorized Epson Servicer to install it for you.

Appendix A

Specifications

CPU and Memory

32-bit CPU	4SX/25C: Intel i486SX, 25 MHz microprocessor in open PGA-type CPU socket; can be upgraded with optional 487SX/25 math coprocessor or Intel ODP486-25 OverDrive processor 4DX/33C: Intel i486DX, 33 MHz microprocessor in PGA-type CPU socket; can be upgraded with optional Intel ODP486-33 OverDrive processor 4DX2/50C: Intel i486DX2, 50 MHz microprocessor in PGA-type CPU socket
System speed	High and low speeds available; high speed is CPU-dependent (25 MHz, 33 MHz, or 50 MHz), low speed is simulated 8 MHz speed; speed selection through keyboard command or SETUP; 0 wait state memory access at high speed
Memory	4MB RAM standard soldered on the system board; expandable to 36MB (maximum) using 1 MB, 4MB. or T6MB SIMMs: SIMMs must be 36-bit, 72-pin, fast-page mode type with 70ns (or faster) access speed
ROM	128KB system BIOS, video BIOS, and SETUP code located in EPROM on main system board
video RAM	512KB on main system board; expandable to 1 MB
Shadow RAM	Supports shadowing of system and video BIOS ROM into RAM
Cache	8KB of internal cache (built into the microprocessor); sockets for up to 256KB of SRAM external cache (optional)
Math coprocessor	On 486DX/33C. and 486DX2/50C systems, math coprocessor built into the microprocessor; optional 487 upgrade available for 25 MHz system
Clock/ calendar	Real-time clock, calendar, and CMOS RAM socketed on main system board with built-in battery backup

Controllers

Video	Cirrus® Logic VGA controller on main system board; with standard 512KB video memory, supports resolutions up to 800 x 600; with 1 MB extended memory, provides resolutions up to 1280 x 1024
Diskette	Controller on main system board supports up to two diskette drives or one diskette drive and one tape drive
Hard disk	Interface on main system board supports up to two IDE hard disk drives with built-in controllers

Interfaces

Monitor	VGA interface built into system board for analog or multifrequency VGA monitor; 15-pin, D-shell connector
Parallel	One standard 8-bit parallel, uni- or bi-directional interface built into main system board; I/O address selectable through SETUP; 25-pin, D-shell connector
Serial	Two RS232C. programmable, asynchronous interfaces built into main system board; 9-pin, D-shell connector
Keyboard	PS/2 compatible keyboard interface built into main system board; num lock setting selectable through SETUP; 6-pin, mini DIN connector
Mouse	PS/2 compatible mouse interface built into main system board; 6-pin, mini DIN connector
Option slots	Four 16-bit (or 8-bit) I/O expansion slots, ISA compatible, 8 MHz bus speed
Speaker	Internal
VGA feature connector	IBM compatible VGA pass-through interface built into main system board; 26-pin connector

Mass Storage

Diskette drives	Three half-height drives maximum configurable using the following: 5.25-inch, 1.2MB (high-density) capacity 3.5-inch. 1.44MB (high-density) capacity 5.25-inch. 360KB (double-density) capacity 3.5-inch, 720KB (double-density) capacity Dual diskette drive: 3.5-inch, 1.44MB and 5.25-inch, 1.2MB
Hard disk drives	3½-inch form factor hard disk drive(s), up to half-height size; the first mounted vertically, second mounted horizontally
Other devices	Half-height tape drive, CD-ROM, or other storage device; 5¼-inch or 3½-inch with mounting frames

Input Devices

Keyboard	Detachable; two-position height; 101 or 102 sculpted keys; country-dependent main typewriter keyboard; numeric/cursor control keypad; four-key cursor control keypad; 12 function keys

Physical Characteristics

Width	14.8 inches (370 mm)
Depth	16.5 inches (412 mm)
Height	4.8 inches (120 mm)
Weight	16.7 lb (7.5 kg). with one diskette drive and one hard disk, but without keyboard

Power Supply

Type	85 Watt, fan-cooled
Input ranges	90 to 264 VAC
Maximum outputs	+5 VDC at 11 Amps, +12 VDC at 2.0 Amps, –5 VDC at 0.3 Amps, –12 VDC at 0.3 Amps
Frequency	47 to 63 Hz

Option slot power limits

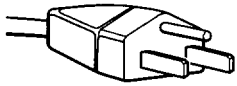
Maximum Current	**+5 Volts**	**+12 volts**	**-5 Volts and -12 Volts**
For each slot	7 Amps	1.5 Amps	0.3 Amps
For all four slots	16 Amps	3 Amps	0.3 Amps

Environmental Requirements

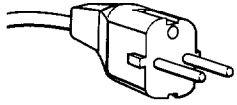
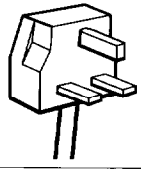
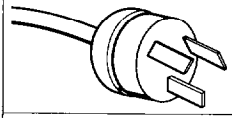
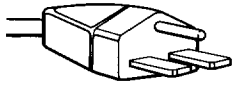
Condition	**Operating range**	**Non-operating range**	**Storage range**
Temperature	41° t0 90° F (5° to 32° C)	-4°to140°F (-20° to 60° C)	-4° to 140° F (-20° to 60° C)
Humidity (non-condensing)	20% to 90%	10% to 90%	10% to 90%
Altitude	-330 to 9,900 ft (-100 to 3,000 m)	-330 to 39,600 ft (-100 to 12,000 m)	-330 to 39,600 ft (-100 to 12,000 m)
Maximum wet bulb	68° F (20° C)	104°F (40° C)	134° F (57° C)
Acoustical noise	37.5 dB(A)	N/A	N/A

Power Source *Requirements*

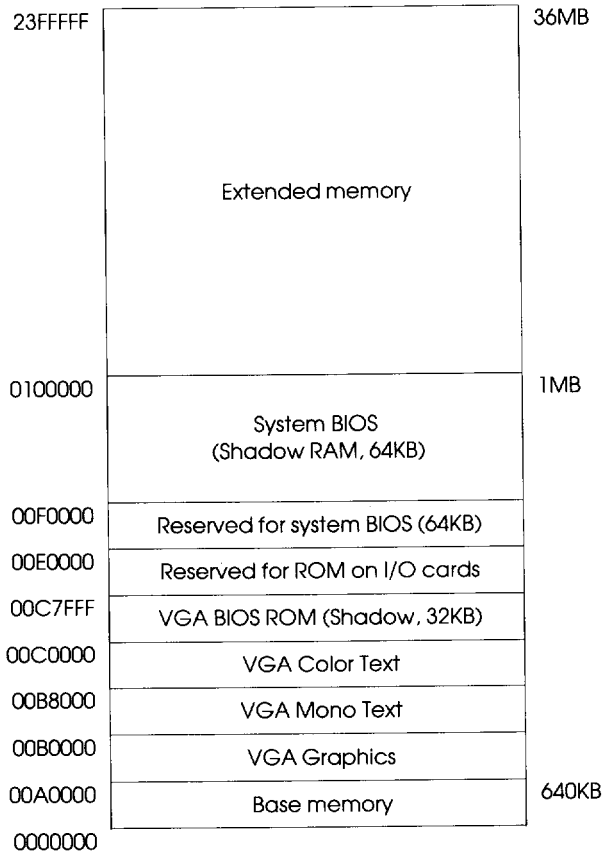
120 Volt power source requirements

AC plug	Plug type	Reference standards	Power cord
	North America 125V, 10A	ANSI C73.11, NEMA 5-15-P, IEC 83	UL/CSA Listed, Type SJT, no. 18/3AWG, or no. 16/3AWG, or <HAR> 300V, 10A or 13A

240 Volt power source requirements

AC plug	Plug type	Reference standards	Power cord
	Europe 240V, 10A to 16A	CEE 7/7 IEC 83 IEC 127 HD 21	<HAR> 1.00 mm² 300V, 10A
	UK 240V, 10A	BS 1362 BS 1363A IEC 83 IEC 127 HD 21 EN 60 320-1 ASTA mark	<HAR> 1.00 mm² 300V, 10A
	Australia 240V, 10A	AS C112 IEC 127 HD 21	<HAR> 1.00 mm² 300V, 10A
	North America 240V, 15A	ANSI C73.20, NEMA 6-15-P, IEC 83 UL 198.6	UL/CSA Listed Type SJT no. 18/3AWG, 300V, 10A

System Memory Map



Glossary

Access speed

The time it takes for a device, such as memory or a disk drive, to return data. For example, your computer's SIMMs return data requested by the microprocessor at an access speed of 70ns.

Address

The location where information is stored in a computer's memory.

Analog monitor

A monitor that generates or responds to analog data. Analog data is transmitted by varying the voltage levels in a continuous current and can produce an infinite number of colors or gray shades.

Application program

A software program that performs a specific task, such as word processing. Note that an application program is different than an operating system, which controls the computer's hardware and software.

Asynchronous

Data transmission in which one machine sends data to another, one character at a time, at intervals that do not need to be synchronized to a timing device, such as a system clock.

AUTOEXEC.BAT file

The batch file your computer runs automatically whenever you load MS-DOS. It configures the installed system devices and sets various user preferences. See also *Batch file.*

Base memory

See Conventional memory.

Batch file

A file that executes commands automatically. Batch files are text files with the filename extension .BAT. When you type the filename, the operating system sequentially executes the commands in that file.

BIOS

Basic Input/Output System. Routines in ROM (Read Only Memory) that handle the transfer of information among various hardware components, and between the hardware and your operating system.

Boot

The process a computer performs to check its components and then load the operating system into memory.

Bus

A wire or group of wires that sends information between components in the computer. The speed of a bus increases by the number and width of the channels the bus uses to move data.

Cache

A high-speed memory buffer that stores frequently used data where your microprocessor can access it faster. Your computer includes 8KB of internal cache expandable to 256KB with external cache chips.

C G A

Color Graphics Adapter. A display adapter card that can generate up to 25 lines of text with 80 characters on each line, two-color graphics at 640 x 200 resolution, or four-color graphics at 320 x 200 resolution.

Chip

A piece of silicon containing miniature transistors and resistors wrapped in insulating material. Chips process electrical signals sent to them and then transmit the processed signals to the computer system. Also called an integrated circuit. See also CPU.

CMOS

Complementary Metal-Oxide Semiconductor. A low-power silicon chip used for RAM and switching applications that is backed up by a battery.

Command prompt

The symbol or message that displays on the screen to tell you that the operating system is loaded and ready to receive instructions. The default MS-DOS command prompt displays the current drive and directory. If you are logged onto drive C, the command prompt may look like this: **C** : \>.

configuration

The setup of your computer's internal and external components. A typical configuration consists of a computer with a certain amount of memory, one diskette drive, and one hard disk drive connected to a monitor, printer, and keyboard.

Conventional memory

The memory in the computer below 1MB that is available to MS-DOS and application programs-usually 640KB. Also called base memory or main memory.

Coprocessor

See Math coprocessor.

Copy-protected program

A program containing a software "lock" that prevents it from being copied. See also Key disk.

CPU

Central Processing Unit. The primary device that interprets instructions, performs tasks, keeps track of stored data, and controls input and output operations. See also *Microprocessor.*

Cursor

The highlighted marker or pointer that shows where keystrokes will appear when typed or where the next mouse command will be executed.

Cylinders

The vertical alignment of tracks in a hard disk that can be lined up under one read/write head. The number of tracks on a disk is equal to the number of cylinders times the number of heads. See also *Tracks.*

Default

Any value or setting choice that applies when you don't specify an alternative. A default value stays in effect unless you override it temporarily or change the default value itself.

Device

A piece of equipment that is part of a computer system, such as a disk drive, a monitor, or a printer.

Device driver

A file containing instructions that allow your computer to recognize and communicate with a device. The device may be a printer, monitor, or other type of device.

Diagnostics

See Power-on diagnostics,

DIP switch

Dual Inline Package switch. A small rocker- or sliding-type switch that controls a particular function.

Directory

A group of files stored in a particular area on a disk. A directory listing shows the name, location, and size of the files in the directory. A directory can contain both files and subdirectories.

Display adupter card

A circuit board that can be installed in one of the computer's option slots to control the way a monitor displays text and graphics. A VGA display adapter is built into your computer's main system board. Also called video card.

DOS

Disk Operating System. The generic term for the operating system software **that** controls a computer and directs its input and output functions. See also MS-DOS and *Operating system.*

Double-density

A type of diskette format that allows you to store twice as much data as the standard-density format. A 3.5-inch, double-density diskette can store 720KB of data. A 5.25-inch, double-density diskette can store 360KB of data.

EGA

Enhanced Graphics Adapter. A display adapter card that allows you to display high-resolution graphics on an EGA monitor. It can display up to 43 lines of text with 80 characters on each line, or it can display monochrome or lbcolor graphics at resolutions up to 640 x 350.

Expanded memory

Memory that specially-written MS-DOS programs can use when an expanded memory manager program maps that memory into an accessible area. See also Memory *manager.*

Extended memory

Memory above 1MB that is accessed by 386 or 486 microprocessors when they are operating in protected or virtual mode. This memory is available to OS/2 programs, but is available to MS-DOS only if an extended memory manager program is installed. See also *Expanded* memory and *OS/2.*

Format

To prepare a new disk (or an old one you want to reuse) so that the data you store on it can be used by your operating system. Formatting divides a disk into tracks and sectors and creates addressable locations where your operating system can find the data.

High-density

A type of diskette format that allows you to store more data than on single- or double-density diskettes. A 5.25-inch, high-density diskette can store 1.2MB of data. A 3.5-inch, high-density diskette can store 1.44MB of data.

IDE

Integrated Drive Electronics. A type of hard disk drive interface in which the controller is on the drive instead of on a controller card. Your computer includes an interface on the main system board for up to two IDE hard disk drives.

Interface

A physical or software connection used to transmit data between equipment or programs so they can work with each other.

Jumper

A small moveable plug that connects two pins on a device's circuit board. Jumpers alter the operation of a particular function.

Key disk

A diskette containing a copy-protected program that must remain in a diskette drive while you use the program. See also *Copy-protected program.*

Kilobyte (KB)

A unit used to measure storage space in a computer's memory or on a disk. One kilobyte equals 1024 bytes.

LIM EMS 4.0

Version 4.0 of the Lotus/Intel/Microsoft Expanded Memory Specification-your computer's capability to support programs that use expanded memory. See also *Expanded memory*.

Main system board

The circuit board inside your computer containing the circuitry and components your computer needs to operate.

Math coprocessor

A device that enables the computer to process mathematical calculations faster by using floating point numbers instead of whole numbers.

Megabyte (MB)

A unit used to measure storage space in a computer's memory or on a disk. One megabyte equals 1024KB (kilobytes).

Megahertz (MHz)

A unit used to measure oscillation frequency, such as that of a computer's internal clock. A megahertz is one million cycles per second.

Memory

The area where your computer stores data. Memory contents are stored permanently (in ROM) or temporarily (in RAM).

Memory manager

A program that controls the memory in your computer so that different applications do not use the same portion of extended memory at the same time.

Memory module

A small circuit board, commonly called a SIMM (single inline memory module), that contains surface-mounted memory chips. You can add memory modules to the main system board to expand your computer's memory.

MGA

Multi-mode Graphics Adapter. A display adapter card that can display monochrome text and color graphics.

Microprocessor

A small CPU on one semiconductor chip. See also CPU.

Modem

MOdulator/DEModulator. A device that allows a computer to transfer data to and from another computer by transmitting signals over telephone lines.

Monochrome monitor

A monitor that displays in only one color (such as green, white, or amber).

Mouse

A hand-held pointing device with one or more buttons. Sliding the mouse over a surface moves the cursor in the same direction on the screen. Pressing (or clicking) a mouse button selects the item on the screen at the cursor position.

MS-DOS

Microsoft Disk Operating System. The operating system most commonly used with your computer. See also DOS, *OS/2,* and *Operating system.*

Numeric keypad

The number and cursor control keys grouped together on the right side of the keyboard. The operation of the dual-use keys on the numeric keypad is controlled by the [Num Lock] key.

Operating speed

The speed at which the computer's processor can execute commands, usually expressed in megahertz (MHz). See also *Megahertz.*

Operating system

A collection of programs that manage a computer's operations, such as interpreting input, managing files, and reading and writing data to disk. The operating system (such as MS-DOS, OS/2, or UNIX) provides the foundation for the other programs and controls hardware resources.

Option curd

A circuit board you can install inside the computer to provide additional capabilities, such as a modem or an additional I/O port. Option cards plug directly into option slots so you do not have to alter a computer's circuitry to enhance your system.

OS/2

Operating System/2. The operating system developed jointly by Microsoft and IBM that provides protected mode processing and multitasking capabilities. See also DOS, *MS-DOS,* and *Operating system.*

OverDrive processor

An optional microprocessor chip that doubles the internal processing speed of the microprocessor and includes a built-in math coprocessor.

Parallel

An interface that transmits data simultaneously over separate wires in a cable. *See* also *Interface* and *Serial.*

Parameter

A qualifier added to a command that tells your operating system what data to process, where it should locate or store a file, or how it should operate. *See* also *Switch.*

Pathname

The directory name(s) you specify to locate a file. For example, the pathname for the file SALES, stored in the subdirectory BUSINESS, is \BUSLNESS\SALES.

Peripheral device

An external device (such as a printer or a modem) connected to a computer that depends on the computer for its operation.

Port

A physical socket on a computer to which you can connect a peripheral device.

Power-on diagnostics

Tests stored in a computer's ROM that the computer runs to check its internal circuitry, peripheral device configuration, and operating status each time you turn it on or reset it.

Processor speed

See Operating speed.

Prompt

A message displayed to request information or tell you what action to perform next. See also Command prompt.

RAM

Random Access Memory. The area of the computer's memory used to run programs and store data while you work. All data in RAM is erased when you turn off or reset the computer.

Read

To gather data from one source (such as a disk) and transfer it to a device (such as a screen or a printer). For example, when you open a file stored on disk, the computer reads the data from the disk and displays it on the screen. See also Write.

Read/write head

The physical device inside a disk or tape drive that reads data from and writes data to the magnetic surface of the disk or tape.

Real-time clock

A clock inside the computer that keeps track of the time and date, even when the computer is turned off, by using power from a backup battery.

Refresh rate

The frequency with which a monitor can redraw a screen image. The faster the refresh rate, the less the screen will flicker.

Reset

To restart a computer without turning it off. You can reset your computer by pressing Ctrl Alt Delete. Resetting erases all data stored in RAM and reloads your operating system.

ROM

Read Only Memory. Memory that can only be read and cannot be modified. ROM retains its contents even when you turn off the computer by using power from a backup battery.

Root directory

The main directory in a hierarchical disk directory structure. All other directories are subdirectories of the root directory.

RS-232C

A standard type of serial communication. You can connect an RS-232C device to either of the computer's RS-232C serial ports.

Serial

The type of communication that transmits data from a serial interface to a serial device over a single wire. *See* also *Interface* and *Parallel.*

Shadow RAM

The feature in your computer that copies the contents of the system, video, and external BIOS ROMs into the RAM area of memory to speed up processing.

SIMM

See Memo ry module.

Subdirectory

In a hierarchical disk directory structure, a group of files in a directory within another directory or the root directory.

System diskette

A diskette that contains the operating system and can be used to boot the computer.

Tape drive

The physical device that allows you to insert large-capacity magnetic tape cartridges for compact data storage and backup.

UNIX

An operating system that supports multitasking and is especially suited to multi-user environments. UNIX is compatible with a range of computers, from personal computers to mainframes. See also *Operating system.*

VGA

Video Graphics Array. A high-resolution display adapter that provides a variety of video modes. Your computer's built-in VGA controller supports resolutions up to 1280 x 1024 on a compatible monitor, depending on the amount of video RAM.

Video curd

See Display adapter card.

Write

To transfer data to a storage device (such as a disk) or an output device (such as a monitor or printer). See also *Read.*

Write-protect

To protect the data on a diskette from being changed by setting the write-protect switch on a 3.5-inch diskette or by placing a write-protect tab over the notch on a 5.25-inch diskette. You cannot change data on a write-protected diskette.

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